TENDER DOCUMENT FOR

CONSTRUCTION & COMMISSIONING OF RCC OHSR 300 KL CAPACITY VILLAGE PALANA

TEHSIL BIKANER

DISTRICT BIKANER

ESTT. COST: RS. 42.00 LACS

NIT NO. 317 /2019-20

VOLUME-I

INSTRUCTION TO BIDDERS

CONDITIONS OF CONTRACT

AND PRE-QUALIFICATION SCHEDULES

EXECUTIVE ENGINEER

PHED DISTRICT RURAL DN.II BIKANER

Tender Document For

CONSTRUCTION & COMMISSIONING OF RCC OHSR 300 KL CAPACITY VILLAGE PALANA

Volume – I

(Instruction to Bidders, Conditions of Contract and Pre-qualification Schedules)

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Tender Downloading Form

S.No.	ITEM	Particulars
1.	Name of Work	***CONSTRUCTION & COMMISSIONING OF RCC OHSR 300 KL CAPACITY VILLAGE PALANA***
2.	NIT No.	**EE/PHED/BKN/ 317/2018-19**
3.	Tender Fee & RISL Charges	1. Rs. 2000.00 (To be paid in favour of **Executive Engineer, PHED, District Rural Dn.II Bikaner.** 2. Rs. 1000.00 through Demand Draft / Banker Cheque in favour of Managing Director, RISL, Jaipur, payable at Jaipur
4.	Bid Cost	Rs 42.00 lacs
5.	Bid security	Rs 84,000.00
6.	Period for completing execution	6 months
7.	Date of downloading of Tender Documents	up to 18.01.2020 (18.00 hours) from website http://eproc.rajasthan.gov.in
8.	Downloaded by	M/s ....
9.	Tender Fee & RISL Charges Received Vide	Tender Cost : DD/Cash Receipt/ Bankers Cheque No..... Dated ..... RISL Charges : DD / Bankers Cheque No..... Dated .....

NIT For Publication

OFFICE OF THE EXECUTIVE ENGINEER, PHED, DISTRICT RURAL DN.II-BIKANER

S.No.:SEBI/Tech/Tenders/..... Date: .....

NOTICE INVITING E-TENDERS FOR WORKS

Online tenders are hereby invited on behalf of the Governor of Rajasthan for the following works from enlisted appropriate class contractors. The tender documents can be download from website **http://eproc.rajasthan.gov.in**. upto …… and bids may be submitted on same date. Prequalifitcation bids will be opened on …….. Detail of this tender notification and pre-qualification criteria can be seen in NIT exhibited on website **www.dipronline.org, http://eproc.rajasthan.gov.in** departmental website **www.rajwater.gov.in** and SPP Portal. Tenders are to be submitted online in electronic format on website **http://eproc.rajasthan.gov.in.**

S.No	NIT No. ACEBI/	Work Description	Estimated Cost (Rs. in lacs)	Bid security in Rs.	Cost of Tender Docu-ment in Rs.	Period for Completing Execution
1	317/ 2019-20	**CONSTRUCTION & COMMISSIONING OF RCC OHSR 300 KL CAPACITY VILLAGE PALANA**	42.00	84000	2000	6 months

Cost of Tender Documents shall be paid in DD/ Banker Cheque drawn in favour of **Executive Engineer PHED District Rural Dn.II Bikaner**, payable at Bikaner. In addition to that RISL Charges is to be paid for Rs. 1000.00 through Demand Draft / Banker Cheque in favor of Managing Director, RISL, payable at Jaipur.

SAVE WATER – SAVE LIFE

Executive Engineer,
PHED, District Rural Dn.II Bikaner.

NIT For Web Site

OFFICE OF THE EXECUTIVE ENGINEER, PHED, DISTRICT RURAL DN.II-BIKANER

NOTICE INVITING TENDERS FOR WORKS

1- Online tenders are hereby invited on behalf of the Governor of Rajasthan for the following works from enlisted appropriate class contractors with the Departments under the Government of Rajasthan and enlisted contractors with CPWD/ Postal, Telecom, Railway, MES, other state Govt. / Central Govt. undertaking/ organizations equivalent to 'AA' and 'A" Class of Rajasthan provided they meet out prescribed eligibility criteria, after giving prescribed Bid security. The tender documents can be downloaded from web site **http://eproc.rajasthan.gov.in.** Detail of this tender notification and pre-qualification criteria can also be seen in NIT exhibited on website **www.dipronline.org**, departmental website **www.rajwater.gov.in** and SPP Portal. Tenders are to be submitted online electronic format on website **http://eproc.rajasthan.gov.in.**

2- GENERAL DETAIL OF WORKS:

S.No	NIT No. ACEBI/	Work Description	Estimated Cost (Rs. in lacs)	Bid security in Rs.	Cost of Tender Document in Rs.	Period for Completing Execution
1	317/ 2019-20	**CONSTRUCTION & COMMISSIONING OF RCC OHSR 300 KL CAPACITY VILLAGE PALANA**	42.00	84000	2000	6 months

3- (a) Tender document consisting of the detailed plan, complete specifications, schedule of quantities of the various classes of work to be done and the set of conditions of contract to be complied with by the persons whose tender may be accepted, which will also be found printed in the form of tenders, can be seen & downloaded from web site mentioned above.

(b) All addenda, corrigendum, modification or other changes (dates etc.) will be notified on the website **eproc.rajasthan.gov.in** only. No communication regarding this tender shall be published in newspapers.

(c) The cost of tender document is to be paid in Cash/ DD in the name of **Executive Engineer PHED District Rural Dn.II Bikaner** in the manner prescribed in tender document.

4- IMPORTANT DATES:

S. No.	Events	Date & Time	Location
a.	Availability of Tender Document	upto 18.01.2020 (18:00 hours)	http://eproc.rajasthan.gov.in
b.	Last date & time for downloading of tender document.	upto 03.02.2020 (18:00 hours)	http://eproc.rajasthan.gov.in
c.	Last date & time for online submission of Tender.	upto 03.02.2020 (18:00 hours)	http://eproc.rajasthan.gov.in
d.	Physical Submission of Tender Fee and EMD.	upto 04.02.2020 (upto 12.00 hours)	Office of the Executive Engineer PHED District Rural Dn.II Bikaner
e.	Online Opening of Pre-Qualification	04.01.2020 at 13.00 hours	http://eproc.rajasthan.gov.in
f.	Online Opening of Price bid	Will be intimated to all pre-qualified bidders	http://eproc.rajasthan.gov.in in the office of Executive Engineer PHED District Rural Dn.II Bikaner

Note: - In case there is a holiday on the date mentioned at no. (d) & (e) the activities assigned on that date shall be carried out on the next working day.

5- Instruction to Bidders for online e-tendering

a. The bidders who are interested in bidding can download tender documents from http://eproc.rajasthan.gov.in

b. Bidders who wish to participate in this tender will have to register on http://eproc.rajasthan.gov.in. Further Bidders who wish to participate in online tenders will have to procure Digital Certificate as per Information Technology Act-2000 using which they can sign their electronic bids. Bidders are advised to refer the orders issued by the Finance Department, Government of Rajasthan vide F.1(1)FD/GF&AR/2007(Circular No.19/2011) dated 30.09.2011 for getting aware with e-tendering process.

c. Bidder shall submit their offer on-line in Electronic format on above mentioned web site up to time and date mentioned here in above.

6. **Eligibility Criteria –**

6.1 : NIT no. Work of construction & commissioning of RCC OHSR Palana:-

6.1.1 Valid Registration:- Enlisted atleast ''C" Class contractors with the Departments under the Government of Rajasthan and enlisted contractors with CPWD/ Postal, Telecom, Railway, MES, other state Govt. / Central Govt. undertaking/ organizations equivalent to 'A' and 'AA' Class of Rajasthan provided they meet out prescribed eligibility criteria, after giving prescribed Bid security.

6.1.2 TECHNICAL CRITERIA: The bidder should have experience of following works related to drinking water supply schemes/projects during last 7 years up to the date of submission of tenders:

SN	Parameters	Criteria
1.	OHSR	Execution and commissioning of a RCC OHSR of capacity equal to or more than 100 KL.

6.1.3 Bid security:- An Bid security of **Rs. 84,000.00** must be deposited in physical form in the office of the Executive Engineer PHED District Rural Dn.II Bikaner. The Bid security shall be accepted in cash/Demand Draft in favour of "Executive Engineer, PHED, District Rural Dn.II, Bikaner", payable at Bikaner. The enlisted contractors in class "A" and above with PHED Rajasthan, shall be required to deposit **Rs 21,000.00** (0.5% of estimated cost of NIT) as Bid security in the aforesaid form. Tenders without Bid security or with part Bid security will not be opened.

General Note:

I. The works which have been completed and commissioned during the period mentioned above, though may have commenced earlier, shall be considered for experience purpose.
II. Similar work for experience of execution of work / scheme / project means execution of a work / scheme / project having at least 2 components similar to those included in scope of tender.
III. If single NIT for a work has been invited and work order has been given in two split orders, both the split orders shall be considered jointly for experience purposes.
IV. For considering experience of the bidder, out of its experience as JV, its own works in the JV shall have to be asked with relevant evidence/certificates
V. Satisfactory completion certificate of the relevant work should be from an officer not below the rank of Executive Engineer or its equivalent. The certificates should be submitted with relevant work orders.
VI. No Joint venture is allowed

Online submission of tenders will be opened on the scheduled date at specified time mentioned at Serial No. 4 (e) in the Table above by tender opening committee in the office of Executive Engineer PHED District Rural Dn.II Bikaner.

7- Before electronically submitting the tenders, it should be ensured that all the tender papers including conditions of contract are digitally signed by the tenderer.

8- Each work is to be completely finished to the satisfaction of Engineer-in-charge within stipulated period strictly from the 10th day after the date of written/ e-mailed order to commence the work.

9- Security Deposit @ 10% of the gross amount of the running bill shall be deducted from each running bill and shall be refunded as per rules on completion of the contract as per terms and conditions. The Bid security deposited shall however be adjusted while deducting security deposit from first running bill of the contractor. There will be no maximum limit of security deposit.

10- A contractor may, however, elect to furnish bank guarantee or any acceptable form of security for an amount equal to the full amount of security deposit @ 10% of work order before or at the time of executing agreement. In that case Bid security may be refunded only after furnishing of bank guarantee as above. During execution of work or after completion of the work also a contractor may replace the security deposit by furnishing bank guarantee for an equal amount. However, during execution of the work if cost of work exceeds as shown at the time of furnishing bank guarantee, balance security deposit shall be deducted from the Running Account Bills.

11- All compensation or other sums of money payable by the contractor to the Government under the terms of his contract may be deducted from or paid by the sale of a sufficient part of his Security Deposit, or from interest arising there from, or from any sums, which may be due or may become due to the Contractor by the Government on any account whatsoever, and in the event of his Security Deposit being reduced by reason of any such deduction or sale as aforesaid, the contractor shall within ten days thereafter, make good in cash or bank guarantee or Nationalized/Scheduled bank as aforesaid, any sum or sums which may have been deducted from or raised by sale or his Security Deposit or any part thereof.

12- The tender should be accompanied with latest Sales Tax Clearance Certificate from the concerned department authorities, without which the tenders may not be entertained.

13- The tender for works shall remain open for acceptance for the period of 70 days from the date of opening of pre-qualification/ technical bid or up to such period as detailed out in tender document.

14- If any tenderer withdraws his tender prior to expiry of validity period as mentioned at S.No. 13 or mutually extended period or makes modifications in the rates, terms and conditions of the tender within the said validity period, which are not acceptable to the department, or fails to commence the work in the specified period/ fails to execute the agreement, the department shall without prejudice to any other right or remedy be at liberty to forfeit the amount of Bid security given in any form absolutely. If any contractor, who having submitted a tender does not execute the agreement or start the work or does not complete the work and the work has to be put to re-tendering, he shall stand debarred from participating in such re-tendering in addition to forfeiture of Bid security/ security deposit and other action under agreement. If there is strong justification of believing that the tenderer or his authorized has been guilty of mal-practices such as submission of forged documents, influencing individually or politically, his offer will be liable to rejection and in such case his Bid security shall be forfeited.

15- All tenders, in which any of the prescribed conditions are not fulfilled or which have been vitiated by errors in calculations, totaling or discrepancies in figures or words or other discrepancies, will be liable to rejection.

16- Enlisted contractors, will be required to pay Bid security @ 0.5% of the estimated cost of work put to tender, in case of work for which they are authorized to tender under Rules for Enlistment of Contractors, but the amount to the extent of full Bid security shall be liable to be forfeited in the event of circumstances explained at S. No. 14 above.

17- No conditional tenders shall be accepted and will be rejected summarily forthwith.

18- The department will not be responsible for any delay on account of late submission of tender.

19- All pages and schedule of tender document shall be essentially filled in (where ever required) and should be digitally signed by the tenderer.

20- The acceptance of the tender will rest with the competent authority who does not bind itself to accept the lowest tender, and reserves to it-self the authority to reject any or all the tenders received without assigning any reason.

21- No refund of tender fee is claimable for tenders not accepted or forms not submitted.

22- The work may be split up between two or more contractors or accepted in part and not in entirety if considered expedient.
23- All other conditions shall be prevailing as detailed out in the departmental tender document (in the respective sections/ volumes).
24- New Government GST Laws has enforced from 1st july 2017. This new law of tax does not allow any exemption on specified components of material / service used in water supply project. Therefore this clause should be ambended as – Bidders are required to accout for the applicable GST while preparaing their price bids. However if the Central Goverenment through a notification issued after submission of tender for exempting any tax and the contractor avails the benefit of exemption the same shall be passed to the department. So that bidder advised that all taxes included in this price quoted before tender submission.

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PHED, District Rural Dn.II Bikaner.

Instructions to Bidders

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1. General information

1.1 Tender Cost

The tender document cost amounting to Rs. 2000/- will be deposited in cash or through DD in favor of Executive Engineer PHED District Rural Dn.II Bikaner Payable at Bikaner. The documentary proof of depositing tender document cost is to be placed in envelope "A" and deposited physically in the office of Executive Engineer PHED District Rural Dn.II Bikaner up to the date and time specified in the tender document. The receipt of an Accountant, Cashier or any other official, not authorized to receive such amount, will not be considered as an acknowledgement of payment to the Executive Engineer PHED District Rural Dn.II Bikaner or other duly authorized officer.

1.2 Executing Agency

The Executing Agency of this project is the Public Health Engineering Department (PHED) of Rajasthan through the Superintending Engineer, PHED Circle Bikaner and EE, PHED District Rural Div. II, Bikaner.

1.3 Type of Contract

The works described in this tender document are considered to be a single point responsibility turnkey job. The Contractor is responsible for the entire site reconnaissance, field investigations, design, drawing, implementation, testing & commissioning, operation & maintenance of the work as described in the tender documents. The contract is a percentage above / below cum item rate contract.

1.4 Tenderer to inform himself fully

All works, proposed for execution under the Contract, are notified in Volume II of the tender document under the headline “Scope of work and Technical Specifications”.

The Tenderer shall read the specification and study the conceptual drawings carefully before submitting the tender.

The Tenderer is required to carefully study all instructions, forms, terms, conditions and other details in the tender documents. Failure to upload complete and legible information as required in the tender documents or submission of a tender not substantially responsive as per requirements of the tender document in every respect will be at the Tenderer(s) risk and may result in rejection of its tender.

1.5 Declaration

The tenderer shall sign a declaration under the official Secrets Act **(Annexure 4)** for maintaining secrecy of the tender documents, drawings or other records connected with the work given to him in form given below. The unsuccessful tenderer shall return all the drawings given to them.

Declaration

“I/We hereby declare that I/We shall treat the tender documents, drawings and other records, connected with the work, as secret confidential documents and shall not communicate information derived therefrom to any person other than a person to whom I/We am/are authorized to communicate the same or use the information in any manner prejudicial to the safety of the same”.

Failure to observe the secrecy of the tenders will render tenders of the Tenderers, liable to summary rejection.

1.6 Site for Execution of Work

The site for execution of the work will be made available as soon as the work is awarded. In case, it is not possible for the Department to make the entire site available after the award of the work in one goal, the Tenderer shall arrange his working program accordingly. No claim, whatsoever, for not giving the site in full on award of the work or for giving the site gradually in parts will be tenable. The Tenderer may satisfy himself regarding site, acquisition of land approach roads etc.

1.7 Rejection of Conditional tenders

Tenderers shall submit unconditional tenders only. Conditional tenders are liable to be rejected summarily. The tender documents show the specific terms and conditions on which tenders are required by the Department, Hence the tenders should be in strict conformity with the tender documents and should be fulfilled in, wherever necessary, and initialled. Incomplete tender is liable to be rejected. The terms and conditions of the tender documents are firm; as such conditional tenders are liable to be rejected.
If it is found that the tender is not submitted in proper manner, or contains too many corrections and or unreasonable rates or amounts, it would be open for the competent authority not to consider the tender, forfeit the amount of Bid security and/or delist the contractor.

1.8 Complying with Apprenticeship Act

The contractor shall comply with the provisions of the Apprenticeship Act, 1961, and the rules and orders issued, thereunder, from time to time. If he fails to do so, his failure will be a breach of the contract and the original sanctioning authority in his discretion may cancel the contract The Contractor shall also be liable for any pecuniary liability arising on account of violations by him of the provisions of the Act.

1.9 GST

New Government GST Laws has enforced from 1st july 2017. This new law of tax does not allow any exemption on specified components of material / service used in water supply project. Therefore this clause should be ambended as – Bidders are required to accout for the applicable GST while preparaing their price bids. However if the Central Goverenment through a notification issued after submission of tender for exempting any tax and the contractor avails the benefit of exemption the same shall be passed to the department. So that bidder advised that all taxes included in this price quoted before tender submission.

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1.10 Address for Communication

All communications in reference to this tender must be made to The Executive Engineer, PHED, District Rural Dn. II, Bikaner.

1.11 Time for Execution

The work is to be completely finished to the satisfaction of Engineer-in-charge within 6 **Months** from the 10th day after the date of written order to commence the work. The defect liability period after the successful completion of the work shall be 12 months (1 Year). The commencement of Defect Liability period shall start from the date of issue of completion certificate from Engineer-in-charge. The contractor shall be responsible for operation, maintenance and satisfactory performance of the work under all design & operation condition for the duration of the defects liability period.

1.12 Definitions

1.12.1 FACILITIES

Shall mean all works and its equipment(s), components which have been supplied and /or installed or designed, and/or constructed in the contract for works.

1.12.2 CLAUSE

Unless otherwise mentioned, the reference to “clause” made in any section of the document, it shall mean referenced clause of that section.

1.12.3 BID & TENDER OR BIDDER & TENDERER

The word ‘Bid’ & ‘Tender’ or word ‘Bidder’ & ‘Tenderer’ used in the tender document be treated as synonymous.

2. Eligibility and Pre-qualification Criteria

The tenderer shall fulfill all the following conditions to qualify for tendering for the work :

2.1 Registartion

Enlisted atleast ''C" Class contractors with the Departments under the Government of Rajasthan and enlisted contractors with CPWD/ Postal, Telecom, Railway, MES, other state Govt. / Central Govt. undertaking/ organizations equivalent to 'A' and 'AA' Class of Rajasthan provided they meet out prescribed eligibility criteria, after giving prescribed Bid security.

2.2 **TECHNICAL CRITERIA:** The bidder should have experience of following works related to drinking water supply schemes/projects during last 7 years up to the date of submission of tenders:

SN	Parameters	Criteria
1.	OHSR	Execution and commissioning of a RCC OHSR of capacity equal to or more than 100 KL.

General Note:

I. The works which have been completed and commissioned during the period mentioned above, though may have commenced earlier, shall be considered for experience purpose.
II. Similar work for experience of execution of work/ scheme/ project means execution of a work/ scheme/ project having at least 2 components similar to those included in scope of the tender (pipe line, RCC Reservoir).
III. If single NIT for a work has been invited and work order has been given in two split orders, both the split orders shall be considered jointly for experience purposes.
IV. For considering experience of the bidder, out of its experience as JV, its own works in the JV shall have to be asked with relevant evidence/certificates
V. Satisfactory completion certificate of the relevant work should be from an officer not below the rank of Executive Engineer or its equivalent. The certificates should be submitted with relevant work orders**. (Schedule 3.4)**
VI. No Joint Venture is allowed

2.3 Bid security

An Bid security of Rs. **84,000.00** must be deposited in physical form in the office of the Executive Engineer PHED District Rural Dn.II Bikaner. The Bid security shall be accepted in cash/Demand Draft in favour of "Executive Engineer, PHED, District Rural Dn.II, Bikaner", payable at Bikaner. The enlisted contractors in class "A" and above with PHED Rajasthan shall be required to deposit **Rs 21,000.00** (0.5% of estimated cost of NIT) as Bid security in the aforesaid form. Tenders without Bid security or with part Bid security will not be opened.

2.4 GST

New Government GST Laws has enforced from 1st july 2017. This new law of tax does not allow any exemption on specified components of material / service used in water supply project. Therefore this clause should be ambended as – Bidders are required to accout for the applicable GST while preparaing their price bids. However if the Central Goverenment through a notification issued after submission of tender for exempting any tax and the contractor avails the benefit of exemption the same shall be passed to the department. So that bidder advised that all taxes included in this price quoted before tender submission.

3. Tender Document

3.1 Content of Tender Document

The facilities required, tendering procedures, contract terms and technical requirements are prescribed in the tender documents. The tender documents include the following sections, and addendum's issued till the date of submission of the tender :

Volume I Notice inviting tender

Instruction to Bidders

Prequalification schedule

Condition of contract

Special condition of contract

Volume II Scope of work and technical specifications

Volume III Tender drawings

Volume IV Schedules of prices.

3.2 Cost of Tendering

The Tenderer shall bear all costs associated with the preparation and submission of its tender, and the Department will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the tendering process.

It shall be obligatory on the successful tenderer to pay stamp charges on the contract for preparation of contract agreement, as ruling on date of execution of the contract.

3.3 Site Visit Before Tendering

The Tenderer and any of its personnel or agents will be granted permission by the Department to enter upon its premises and lands for the purpose of such site visits, but the tenderer and its personnel will be responsible for death or personal injury, loss of or damage to property and any other loss, damage, costs and expenses incurred as a result of the site visits.

3.4 Tenderer to Inform Himself Fully

The Tenderer shall be deemed to have satisfied himself as to all the conditions and circumstances affecting the Contract price, as to the general circumstances at the site of the work, as to the general labour position at the site, as to the availability of construction material, water, electricity, as to the transport conditions, as to the climatic and meteorological conditions and to have fixed his prices according to his own view of these. Tenderers are invited to visit the site with prior appointment with the Public Health Engineering Department official.

The Department will not be responsible for the personnel of the Tenderer and for all acts in relation with the site inspection.

No claims except as otherwise expressly provided will afterwards be accepted due to non-inspection of the site. The Tenderer shall be responsible for any misunderstanding or incorrect information however obtained except the information given in writing by the Deptt.

3.5 Omissions, Errors and Clarification; Pre-Tender Meeting

Tenderers shall carefully examine the scope of work and specifications and fully inform themselves as to the conditions and matters, which may in any way affect the work or the cost thereof. Should a Tenderer find discrepancies or omissions in the documents or should he be in doubt as to their meaning he should notify the Department in writing not later than one week earlier or present his request in written form during the pre-bid meeting. The Department will respond to any request which is made prior to or during the pre-bid conference. No such request after the pre-bid meeting shall be entertained

Any resulting interpretation or modification of the tender documents shall be issued to all tenderers as an addendum, which will become a part of the tender documents. The tenderers shall acknowledge in writing the receipt of each addendum on e- tender.

No claims except as otherwise expressly provided will afterwards be accepted due to non-understanding or mis-interpretation of the tender documents.

3.6 Amendment of Tendering Documents

At any time prior to the deadline for submission of tenders, the Department may, for any reason, whether at its own initiative, or in response to a clarification requested by a prospective Tenderer, amend the tender documents.

The amendment shall be timely uploaded at website (www.eproc.rajasthan.gov.in) only and it shall be binding on them. It will be assumed that the information contained therein has been taken into account by the Tenderer in its tender.

In order to provide prospective Tenderers reasonable time to take the amendment into account, in preparing their tender, the Department may, at its discretion, extend the deadline for the submission of tenders, in which case, the Department will notify on website regarding extended deadline for submission of tenders.

4. Preparation of Tenders

4.1 Language of Tender

The tender prepared by the Tenderer and all correspondence and documents related to the tender exchanged by the Tenderer and the Department shall be written either in Hindi or English provided that any printed literature furnished by the Tenderer may be written in another language, as long as such literature is accompanied by a translation of its pertinent passages in the language mentioned herein, in which case, for purposes of interpretation of the tender, the translation shall govern.

4.2 Alteration of Designed Components not acceptable

No principal deviations and exceptions are allowed, in the specifications and in the basic requirements of the total scheme, (including effect due to addendums), such as:

- Pipe material, diameter of pipe, etc.
- Design flow and deign capacity of various components.
- All other basic requirement and capacities of systems.

However apart from such deviations other minor deviations such as those for the material of construction of valves, pumps, etc., made in the provisions of the technical and financial tenders submitted to provide better specifications of material than those asked in the specifications, a statement of deviations and exceptions to the provisions in Volume II shall be given in Volume I. The Tenderers shall enclose no price information with respect to these deviations in Envelope A (Pre Qualification Bid).

The tenderer may substitute other authoritative standards, brand names or catalogue numbers in its Tender, provided that it demonstrates to the Department's satisfaction that the substitutions are equivalent or superior to those designated in the Specifications, except if the Specifications specially provide otherwise (as in case of pipe material, type of pumps etc.)

Tenderers, who propose any alteration in the basic requirement, as specified in Volume II and its addendum if any, or which contain any other conditions of any sort will be liable to rejection.

Inclusion of additional equipment, civil work or other plant and material which in the Tenderer's opinion is required to satisfy the scope of work will not constitute a deviation.

4.3 Makes and origin of the equipment

It is expected that the Tenderer will quote with a view to supply equipment of best makes and conforming to highest standard. Tenderer has to consider for his financial offer, only makes given in the list of approved makes in Volume-I of Tender Document, for the items not specified in the list tenderer should consider for his financial offer of reputed manufacturers of equipments corresponding to the state of art technology and to the latest Indian standards. Tenderer has to consider for his financial offer document or of any superior make if makes are not prescribed of the items, conforming to prescribed specifications indicated in the Volume II - "Scope of Work & Technical specifications". The tenderer shall quote only one price for each item mentioned in Schedule of Prices Volume IV, irrespective of the finally selected make. The Deptt. reserves the right to reject the offer if the makes given in Tender Document are not accepted and alternative makes are offered. By signing his offer, the tenderer agrees to supply any one make given in the tender document and/or accepted by the Deptt. for the price quoted in Schedule of Prices.

Whichever equipment is proposed in the tender or considered by the tenderer for the financial offer, the equipment to be finally provided in case of award shall correspond to the specifications of the tender documents and shall be subjected to the approval of the Engineer in Charge.

In case, the Tenderer proposes to use any imported equipment/part of equipment/material he shall indicate so clearly in his tender and shall be responsible for arranging import license etc. for the same. All expenses to be incurred by the Contractor in connection with such import including customs duty shall be included in the prices quoted.

4.4 Tender Form and Schedule of Prices

The Tenderer shall complete the Schedule of Prices furnished in the tender documents as indicated therein. The terms and conditions for payments shall be in accordance with the provisions of the conditions of contract(s) in Volume–I and IV of tender document referred in ITB Clause.

4.5 Tender Prices

The Contract shall be for the complete Work as described in relevant clause, based on the Schedule of Prices submitted in Volume IV.

The Tenderer should quote his rates in online excel format of the pricebid. The tenderer shall quote his rates in item rate schedule and percentage above/below in BSR schedule in figures in specified cells of Price bid or Bill of Quantities. The online program of eprocurement shall automatically put rate in words (English) and worked out amount on the basis of quantity of work and rate offered by the tenderer in the specified cells of excel file.

Any supplementary Items not specifically listed in the Schedule of Prices but required to be executed for the satisfactory completion of the system as specified, shall not be separately paid for by the Department when executed and shall deemed to have been covered under Lump Sum prices of specified items, in his Schedule of Prices.

As per central Government notification no 06/2006 dated 1-3-2006, as amended by notification no. 06/2007 dated 1-3-2007 and 26/2009 dated 4.12.09, latest circular no.945/6/22011-CX Dt.16.5.2011 with latest modifications, Excise Duty exemption is available on specified components of materials used in water supply projects. Tenderer may study notifications carefully and account for the exemptions that are to be availed while preparing their price Tender. Necessary certificates from the district collector shall be arranged by the department as and when requested. No statuary variations toward any taxes, duties, labour cess, levies etc will be payable to contractor.

If the Central Government through it notification issued after submission of tender for exempting other components of material from excise duty and the contractor avails the benefit of exemption the same shall be passes to the department.

The contractor shall satisfy himself regarding the availability of the material required for execution within the time frame prescribed for the work and if desired shall take into account the cost of superior material to be used as its replacement. No time extension or additional cost shall be allowed on this account.

The prices and amounts quoted by the Tenderer shall allow for all costs including labour, materials, construction plant and equipment, transport charges, any other expenses to fulfil the obligations towards any ITT clause of the tender document refered at clause 3.1, Custom Duty, Octroi, Excise Duty, Incoume Tax, Sales Tax, labour Tax, Turnover Tax, Service Tax, Professional Tax or any other duties, levies, taxes & labour cess etc. Work contract tax or charges whatsoever to the State or Central Department or to the Local Bodies on the components or the completed Works or the operation and maintenance works and for satisfactory performance of the Tenderer's obligations under this contract.

For all imported equipment(s) or components, the Tenderer under this Contract must provide a copy of the duties paid for the record of the department.

4.6 Tender Currency

All prices shall be quoted in the Indian Rupee. The department will not arrange any foreign currencies for import of any type of material/plant/spares etc.

4.7 Bid security

4.7.1 An Bid security of **Rs. 84,000.00** must be deposited in physical form in the office of the Executive Engineer PHED District Rural Dn.II Bikaner. The Bid security shall be accepted in cash/Demand Draft in favour of "Executive Engineer, PHED, District Rural Dn.II, Bikaner", payable at Bikaner. The enlisted contractors in class "A" and above with PHED Rajasthan shall be required to deposit **Rs.21,000.00** (0.5% of estimated cost of NIT) as Bid security in the aforesaid form. However, in cases where Bid security required is more than Rs. 10.00 Lacs, tenderer may opt to deposit Rs. 10.00 Lacs (as part Bid security) in cash/DD, as defined above and remaining portion of Bid security exceeding Rs. 10.00 in the form of Bank Guarantee of any nationalized/ scheduled bank in prescribed form in the name of "Executive Engineer, P.H.E.D. Rajasthan, District Rural Division II, BIKANER". Tenders received without Bid security or with part Bid security, shall be rejected out-rightly.

4.7.2 The Bid security shall be deposited physically in the office of Executive Engineer PHED District Rural Dn.II Bikaner up to the date and time specified in the tender document and proof of deposit (i.e. scan of Banker's Cheque/ D.D. etc) should be uploaded with technical proposal.

4.7.3 Enlisted Contractors of Class "AA" and "A" in PHED, shall be required to pay Bid security @ ½ % of estimated cost of work, in case of work for which they are authorized to tender under Rules for enlistment of Tenderers, but the amount to the extent of full Bid security shall be liable to be forfeited in the event of circumstances explained in ITT Clause 4.7.6 below. The enlisted contractor participating in tender outside PHED, shall require to deposit full 2 % Bid security.

4.7.4 The format of Bank Guarantee for Bid security shall be in accordance with the form of Bid security included as **Annexure-7** to ITT in Volume-I of the tender documents. The Bank Guarantee submitted for Bid security must be valid for six (6) months, from the date of its submission.

4.7.5 The receipt of an Accountant, Cashier or any other official, not authorized to receive such amount, will not be considered as an acknowledgment of payment to the Executive Engineer PHED District Rural Dn.II Bikaner or other duly authorized Engineer.

4.7.6 The Bid security, lodged by the successful tenderer, will be adjusted towards Security Deposits. The remaining Security Deposits may be furnished in the form of Bank Guarantee or in any other approved form of security in lump-sum or the Contractor may choose to allow deduction from running account bills to be made on account of the gross work done, as detailed in Clause 1 of General Conditions of Contract.

4.7.7 The Bid security may be forfeited

a) if the tenderer withdraws or modifies its after opening of tender during the period of tender validity

b) if the tenderer fails to sign the Contract Agreement, in accordance with ITB Clause within the specified time limit, after placement of work order.

c) if a tenderer fails to commence or execute work as per work order within the time specified.

d) If a tenderer does not deposit security money within specified period after the work order is placed.

e) If a tenderer breaches any provision of code of integrity prescribed in Rajasthan Transparency in Public Procurement Act, 2012 or rules there under.

If a tenderer reduces the rates voluntarily or modifies his offer voluntarily after opening of the financial tenders/ negotiations, his offer shall stand cancelled automatically, his Bid security shall be forfeited and action for debarring him from business shall be taken as per enlistment rules.

4.8 Period of Validity of Tender

The tenders for the works shall remain open for acceptance for the period of 70 days from the date of opening of the Pre-Qualification bid or mutually extended period. A tender valid for a shorter period shall be rejected by the Department as being non-responsive.

If any tenderer withdraws his tender prior to expiry of said validity period or mutually extended period or makes modification in the rates, terms and conditions of the tender within the said period, which are not acceptable to the department, or fails to commence the work in the specified period/fails to execute the agreement, the department shall, without prejudice to any other right or remedy, be at liberty to forfeit the amount of Bid security given in any form absolutely. If any Tenderer, who having submitted a tender does not execute the agreement or start the work or does not complete the work and the work has to be put to re-tendering, he shall stand debarred from participating in such re-tendering in addition to forfeiture of Bid security/Security Deposit and other action under agreement.

In exceptional circumstances, the Department may seek the Tenderer's consent to an extension of the tender validity period. The request and responses thereto shall be made in writing or by fax. If a Tenderer accepts to prolong the period of validity, the Bid security shall also be suitably extended.

4.9 Format and Signing of Tender

Bidder shall submit their bid in electronic format digitally signing the same. Bidder shall procure digital certificate as per I.T. Act 2000. Digitally signed tenders submitted online are legally binding under I.T. Act 2000 & require no further authentication.

All the pages of the tender document and the addendums / amendments uploaded by the department on website http://www.eproc.rajasthan.gov.in shall be deemed to have been initialed and accepted by the persons signing the bid when they submit their electronic bid.

The documents listed in ITB clauses, along with the addenda issued till the date of bid submission, shall be filled by the bidder to bind the bidder to the contract. All pages of the bid shall be digitally signed.

The uploaded document of the bid shall contain no alteration, or additions, unless notified. In case the bidder makes and addition or correction, the provision written in the original document, read with the addendum or corrigendum issued, shall prevail.

Tender document consisting of the detailed plan, complete specifications, the schedule of quantities of the various classes of work to be done and the set of conditions of contract to be complied with by the persons whose tender may be accepted, which will also be found printed in the form of tenders, can be seen & downloaded from web site http://eproc.rajasthan.gov.in.

Bidders who wish to participate in this tender will have to register on http://eproc.rajasthan.gov.in (bidders registered on eproc.rajasthan.gov.in before 30.09.2011 need to registered again). To participate in online tenders, Bidders will have to procure Digital Signature Certificate (type II or type III) as per Information Technology Act-2000 using which they can sign their electronic bids. Bidders can procure the same from any of the agency listed on e-procurement web site.

Bidder shall submit their offer in Electronic format on above mentioned web site up to the time & date specified in NIT, after digitally signing the same. Online offers, which are not digitally signed, will not be accepted.

Online tenders will be opened on the scheduled date at specified time mentioned above in the NIT by tender opening committee in the office of Executive Engineer PHED District Rural Dn.II Bikaner.

Before electronically submitting the tenders, it should be ensured that all the tender papers including conditions of contract are digitally signed by the tenderer.

All tenders, in which any of the prescribed conditions are not fulfilled or which have been vitiated by errors in calculations, totaling or other discrepancies may be liable to rejection.

Bidders are also advised to refer "Bidders Manual" available under "downloads" section for further details about the e-tendering process.

Training for bidders on the usage of e-tendering system is also being arranged by RISL on regular basis. Bidders interested for training may contact e-procurement cell, RISL for booking the training slot.

5. Submission of tenders

5.1 Submission, Sealing and Marking of Tenders

Online tenders will have to be digitally signed and submitted in a time stamped electronic sealed tender box on http://eproc.rajasthan.gov.in in manner as describd below.

5.2 Online Submission

The tenders shall be uploaded in three covers. First cover (Technical Tender) shall contain scanned copies of tender fees, processing fees, EMD, in form of DD/ Banker cheque, registration certificate, sales tax clearance certificate & related documents, Second cover shall contain scanned copies of pre-qualification documents and third cover (Financial Bid) shall contain price bid.

5.3 Contents of "First & Second Cover " – Technical Bid

"First Cover" should contain following document exclusively in ".pdf" format:

1. Scanned copy of tender fee DD/ Banker cheque
2. Scanned copy of e- tendering processing fee DD
3. Scanned copy of Bid security DD/ Banker cheque/ BG (**Annexure- 7**)
4. Scanned copy of proof of registration/ enlistment.
5. Scanned copy of Latest Sales Tax clearance certificate.

"Second Cover" should contain following document exclusively in ".pdf" format:

1. Digitally signed complete tender document (Volume I, II & III) and preamble to price bid except price bid (Bill of Quantities) along with schedule of deviation made as per relevant clause
2. Digitally signed all Addenda/amendment/ corrigendums issued by the department for this contract till date of submission
3. Scanned copy of tender letter as per **Annexure – 1**, duly signed by authorized signatory.
4. Scanned copy of the Power of Attorney (If applicable) issued as per **Annexure-2** on non judicial stamp of Rs 100/- in favor of person signing the documents/schedules. In case of partnership firm/ limited Co./group of companies, such power of attorney for the authorized person should be issued by the partner(s) or authorized signatory.
5. Scanned copy of Declaration in **Annexure-3, 4, 5** duly signed by tenderer
6. Scanned copy of Pre-qualification **Schedule 1, 2** duly signed by tenderer
7. Scanned Copy of Pre Qualification Schedule-: Summary of Experience as per **Schedule 3**
8. Scanned copy of **Schedules 4.1, 4.2, 4.3** duly signed by tenderer
9. Scanned Copy(ies) of the Client Certificate(s) as well as Scanned Copy(ies) of relevant work order(s) in support.
10. **Schedule 4.4** : Declaration by the Bidder regarding Qualifications

    a. The pre-qualification information and technical schedules have to be prepared very carefully since they will be the basis for the pre-qualification of firms. Only relevant and to the point information shall be

indicated. The supporting documents must contain all the complementary information assess the quality & the conformity of the proposed material with the specification of the tender documents. Tenderer must not give the information not requested in the tender document nor make any comments. The tenderer shall not furnish indiscriminately complete catalogue of manufacturers & suppliers but only project specific information.

Failure to provide any information may lead to the rejection of the offer.

5.4 Contents of third Cover – Financial Bid

Volume IV, along with all addendums issued till the date of tender submission shall be filled in the MS excel sheet uploaded with the tender document. Contractor is required to fill the specific columns of this sheet in his offer and upload the same after digitally signing it along with all the other documents at the time of online submission of the tenders, as per procedure mentioned in website http://www.eproc.rajasthan.gov.in.

5.5 Deadline for Submission of Tenders

The online tender shall be submitted in the time as per the time schedule mentioned in NIT on http://www.eproc.rajasthan.gov.in.

5.6 Late Tenders

The system does not permit electronic submission of tenders after the due time and date.

6. Tender Opening and Evaluation

6.1 Opening of Tenders by Department

The Executive Engineer PHED District Rural Dn.II Bikaner or other duly authorized Committee will open online tenders in the presence of Tenderer(s) or their authorized representative(s) who may choose to be present at the time of tender opening. The tenders shall be opened in two stages. In first stage the pre-qualification bid shall be opened and evaluated. The financial part shall be opened of responsive tenderers pre-qualified by competent authority, at a later date, which will be informed to all responsive and pre-qualified tenderers.

In first stage, first & second covers of the tenders, as per clause 5.3 will be opened. The tenderers' names, the presence (or absence) of Bid security, and other details such as deviations proposed in Covering letter as per relevant clause, will be announced by the Tender Opening Committee at the opening.

6.2 Preliminary Examination of Tenders

The contents of the first & second covers of the individual tenders will be examined summarily in order to assess their formal conformity and agreement with the instructions and guidance to the Tenderers and the completeness. Any tender not conforming to any of these requirements may be disqualified forthwith at the discretion of Deptt.

6.3 Confidential Treatment

The Deptt will evaluate the tender. Information relating to the examination, clarification and comparison of the tenderers and recommendations for the award of the Contract shall not be disclosed to tenderers or to any other person not officially concerned with the evaluation process until the award to the successful -Tenderer has been announced. Any effort by a Tenderer to influence the evaluation process or the recommendations and decisions for award may result in the rejection of its tender.

6.4 Substantial Tender

Notwithstanding the preliminary examination, the Department will determine the substantial tender. Substantial tenders are those which meet the following requirements:

- Properly signed,

- Proof of depositing Tender Fee and RISL charges
- Proof of depositing Bid security in the required format from a Nationalized/ Scheduled bank,
- Responsive to all requirements of the tender documents and the instructions to tenderers,
- Clarification and substantiation required to assess the quality of the offer,
- No deviations other than those specified in clause above and reservations affecting the scope and quality of the work, limiting the rights of the Deptt. or the tenderers obligations, or whose rectification would affect the competitive position of the other substantial tenderer.

If a tender is not substantially responsive it will be rejected by the Deptt. and will not be considered for further evaluation. The financial offers of insubstantial tenderer will not be opened. The Department's determination of a tender's responsiveness is to be based on the contents of the tender itself without recourse to extrinsic evidence.
It is expressly stated that the information contained in the first & second cover of the tender will be used to define whether a tender is substantial or not. The Tenderers are, therefore, advised to submit complete tenders only.

6.5 Evaluation for Pre-Qualification

The Department will carry out a detailed evaluation of the tenders previously determined to be substantially responsive in order to determine whether the firm is qualified in accordance with the requirements set forth in the tender documents at clause 2. In order to reach such a determination, the Department will examine the information provided in the schedules and the submitted supporting documents, on the basis of the information supplied by the tenderers.

The firms Qualified will be informed by the Department in due course of time.

The Department reserves the right not to consider any deviation that in the sole discretion of the Department is found unacceptable. The Department shall require such deviations to be withdrawn, for the unaccepted deviations. The evaluation subsequently will be made on the rates quoted for such items in original offer.

Executive Engineer PHED District Rural Dn.II Bikaner or other duly authorized Engineer reserves the right to ask for submission of the source of procurement for the materials for which the tenderer has quoted his rates before the tender can be considered for acceptance. If the tenderer, who is called upon to do so, does not submit within a reasonable time of written order to do so, the Department shall be at liberty to forfeit the said Bid security absolutely.

6.6 Financial Evaluation

The original financial offer or the revised financial offer, as the case may be, of the Pre qualified tenderers whose tenders are determined responsive will be opened at a date as notified in NIT.

The Executive Engineer PHED District Rural Dn.II Bikaner or other duly authorized Committee will open the tenders in the presence of Tenderer(s) or their authorized representatives who choose to be present at the time of opening of financial tenders, and will enter the rate/amount of all tenders in the register of Opening of Tenders.

The financial evaluation shall be done on the sum of Item rate Schedule and percentage above / below BSR schedule. In case of discrepancy in rates mentioned in schedule of work, rates given in approved BSR on which estimates are framed shall be assumed as correct.

The Tenders shall be ranked on increasing order of the Tender Price.
Provided that a Financial Bid is substantially responsive, the Procuring Entity will correct arithmetical errors during evaluation of Financial Bids on the following basis:

i. if there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Procuring Entity there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected;

ii. if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and

iii. if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (i) and ii) above.

If the Bidder that submitted the lowest evaluated Bid does not accept the correction of errors, its Bid shall be disqualified and its Bid Security shall be forfeited or its Bid Securing Declaration shall be executed.

7. Award of Contract

7.1 Award Criteria

Subject to ITB Clause **Error! Reference source not found.**, the Department will award the contract normally to the lowest evaluated tenderer.

7.2 Department's Right to Accept Any Tender and to Reject Any or All Tenders

The acceptance of the tender will rest with the Department who does not bind itself to accept the lowest tender and reserves to itself the authority to reject any or all of tenders received without assigning any reason.

The Department's right to accept or reject any or all tenders at any time prior to award of contract, will not incur any liability, to the affected Tenderer or tenderers or any obligation to inform the affected Tenderer or tenderers, of the grounds for the Department's action.

7.3 Department's Right to Vary Quantities

(i) At the time of award of contract, the quantity of Goods, works or services originally specified in the Bidding Document may be increased or decreased by a specified percentage, but such increase or decrease shall not exceed twenty percent, of the quantity specified in the Bidding Document. It shall be without any change in the unit prices or other terms and conditions of the Bid and the conditions of contract.

(ii) If the department does not procure any subject matter of procurement or procures less than the quantity specified in the Bidding Document due to change in circumstances, the Bidder shall not be entitled for any claim or compensation except otherwise provided in the Conditions of Contract.

7.4 Notification of Award

Prior to the expiry of the period of tender validity, the Department will notify the successful Tenderer in writing by registered letter or by fax, to be confirmed in writing by registered letter, that its tender has been accepted. The notification of award will constitute the formation of the contract, for all legal purposes.

7.5 Signing the Contract Agreement

7.5.1 Within ten (10) days of department's notice, the successful tenderer shall sign the contract agreement on non judicial stamp paper as required by law with the concerned Executive Engineer.

The following, duly filled in and signed documents, shall form the contract agreement;

a) Agreement (format placed at Annex 6)
b) Letter of award and any pre-award correspondence between Department and the Tenderer
c) Tender documents contained in;
   - Vol-I : Conditions of Contract , Pre-qualification Schedules
   - Vol-II: Scope of Work and Technical Specification, Annexures
   - Vol-III : Tender Drawings
   - Vol-IV : Schedule of Prices

7.5.2 On acceptance of the tender, the name of the accredited representative(s) of the Tenderer (with a photograph and signature attested), who would be responsible for taking instructions from the Department / Engineer in charge, shall be communicated to the Engineer-in-charge.

7.5.3 After acceptance of the tender, the Tenderer or all partners (in the case of partnership firm) or the authorised representative of the firm with a valid power of attorney will append photographs and signatures duly attested, at the time of execution of Agreement.

7.5.4 Receipts for payments, made on account of a work when executed, by a firm must also be signed by the several partners, except where the contractors are described in their tender as a firm, in which case the receipts must be signed in the name of the firm by one of the partners or by some other person having authority to give effectual receipts for the firm. Sales tax or any other tax on materials, or Income Tax in respect of the contract shall be governed by provisions given in the Conditions of Contract. Deduction of Income Tax at source will be made as per provisions of the Income Tax Act, in force from time to time.

7.5.5 If any Tenderer, who having submitted a tender does not execute the agreement or start the work or does not complete the work and the work has to be put to re-tendering, he shall stand debarred from participating in such re-tendering in addition to forfeiture of Bid security/Security Deposit and other action under agreement.

8. Integrity of tenderer

8.1 Code of Integrity

Any person participating in the procurement process shall –
(a) not offer any bribe, reward or gift or any material benefit either directly or indirectly in exchange for an unfair advantage in procurement process or to otherwise influence the procurement process;
(b) not misrepresent or omit that misleads or attempts to mislead so as to obtain a financial or other benefit or avoid an obligation;
(c) not indulge in any collusion, Bid rigging or anticompetitive behaviour to impair the transparency, fairness and progress of the procurement process;
(d) not misuse any information shared between the procuring Entity and the Bidders with an intent to gain unfair advantage in the procurement process
(e) not indulge in any coercion including impairing or harming or threatening to do the same, directly or indirectly, to any party or to its property to influence the procurement process;
(f) not obstruct any investigation or audit of a procurement process; (g) disclose conflict of interest, if any; and
(h) disclose any previous transgressions with any Entity in India or any other country during the last three years or any debarment by any other procuring entity.

8.2 Corrupt or Fraudulent Practices

8.2.1 The Department defines, for the purposes of this provision, the terms set forth below as follows:

i. "corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution; and
ii. "fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Department, and includes collusive practice among tenderers (prior to or after tender submission) designed to establish tender prices at artificial non-competitive levels and to deprive the benefits of free and open competition.

8.2.2 Any effort by a Tenderer to influence the Department in the Department's tender evaluation, tender comparison or contract award decisions may result in rejection of the Tenderer's tender.

8.2.3 The Department will reject a proposal for award if it determines that the Tenderer recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question.

8.3 Documents sanctity

All documents /certificates submitted by the tenderer on line, shall be considered by the department at the time of the prequalification and technical evaluation. If at any point of time on verification of the documents/certificates submitted by the bidder found to be false/fraud/fake/bogus/counterfeit etc. the contract

shall be liable to be rejected and necessary action shall be taken against the contractor/firm as per rule/law in force.

8.4 Conflict of Interest

The bidder participating in a bidding process must not have a Conflict of Interest

I. A conflict of interest is considered to be a situation in which a party has interests that could improperly influence that party's performance of official duties or responsibilities, contractual obligations, or compliance with applicable laws and regulations.

II. A Bidder may be considered to be in conflict of interest with one or more parties in this bidding process if, including but not limited to:

a. have controlling partners/shareholders in common; or

b. receive or have received any direct or indirect subsidy from any of them; or

c. have the same legal representative for purposes of this Bid; or

d. have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the Bid of another Bidder, or influence the decisions of the Procuring Entity regarding this bidding process; or

e. the Bidder participates in more than one Bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all Bids in which the Bidder is involved. However, this does not limit the inclusion of the same subcontractor, not otherwise participating as a Bidder, in more than one Bid; or

f. the Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the Goods and Services that are the subject of the Bid; or

g. Bidder or any of its affiliates has been hired (or is proposed to be hired) by the Procuring Entity as engineer-in-charge/ consultant for the contract.

8.5 Additional performance security

Additional performance security is to be considered as per Chief Engineer (Technical) & TM, RWSSMB, PHED Rajasthan Jaipur circular No. D&S/O&M/Circular/2018-19/2409-21 dated 27.02.2019.

Signature of the tenderer

Executive Engineer
PHED, District Rural Division II,
Bikaner

Annexures of the Instructions and Guidance to Tenderers

Annex 1 (Tender letter)

Tender Letter

To

The Executive Engineer,
Public Health Engineering Department
District Rural Dn.II Bikaner, (Raj).

Subject: **Tender for "CONSTRUCTION & COMMISSIONING OF RCC OHSR 300 KL CAPACITY VILLAGE PALANA**

Ref: Your NIT No. PHED /EE/ BKN/317/2019-20

Dear Sir,

1. Having carefully examined all the parts of the tender documents and the addenda (if any) for the execution of the above mentioned works, having obtained all requisite information affecting this tender, having visited the site and being aware of all conditions and difficulties likely to affect the execution of the contract, we, the undersigned, hereby offer to execute the single responsibility turn-key job on lump-sum basis as described in the Tender Documents and to hand over the whole of the said works in conformity with the drawings, conditions of contract, technical conditions and scope of work, for the sum indicated in the financial offer and such other sum as may be ascertained in accordance with the Contract.
2. We declare that we have read and understood and that we accept all clauses, conditions, descriptions, drawings of the tender documents volume I to volume IV, and subsequent addenda (if any) without any change, reservations and conditions. If any change, reservation or condition has been made in our tender we herewith withdraw it.
3. We undertake, if our tender is accepted, to commence the work within 10 days of the work order and to complete the work in the stipulated time for completion.
4. If our tender is accepted we will provide a security deposit in the required form in the sums as stipulated in the tender documents.
5. Unless and until the formal agreement is prepared and signed, this tender, together with your written acceptance thereof shall constitute a binding contract between us.
6. We agree to abide by this tender for the period of 70 days from the date of opening of the pre-qualification bids and it shall remain binding upon us and may be accepted by you at any time before the expiry of that period, and not to make any modifications in its terms and conditions which are not acceptable to you.
7. Together with the tender we submit the Bid security of Rs [1)] ..... as [2)] .....Dated this ..... day .....20.....[3)] ..... in the capacity of [4)]..... duly authorized to sign the tender for and on behalf of [5)] .....

Name:
Address:
Telephone: Telefax: Telex:
Signature of the authorized representative .....

1. Amount of Bid security
2. Indicate the form in which it is provided
3. Name of authorized representative of the firm
4. Designation of authorized representative of the firm
5. Name of Tenderer

Annex 2 (Power of Attorney of the representative of a firm)

Power of attorney of the representative of a firm

Power of Attorney for Authorized Representative

M/s……., hereby, authorize the following representative to sign and submit the tender document, negotiate terms and conditions of the contract, to deal with the PHED, to issue and receive correspondence related to all matters of the tender for the work of "Subject: **Tender for "CONSTRUCTION & COMMISSIONING OF RCC OHSR 300 KL CAPACITY VILLAGE PALANA**".We undertake the responsibility arising out of any act of the representative appointed hereby. We do hereby agree to ratify and confirm all acts, deeds and things lawfully done or caused to be done by our said Authorised Representative pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Authorised Representative in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

For Partnership Firm's

S. No.	Name of the All Partner	Signature of Partner with Seal
1.		
2.		
3		
4	Name and Designation of the person Authorized	
5	Attested Signature of the Authorized Representative	

For Company

Name and Designation of the person Authorized	
Firm	
Address	
Telephone No.	
Fax No.	
Telex No.	
Authority By which the Powers is delegated	
Attested Signature of the Authorized Representative	
Name and Designation of person attesting the signatures	

To be Prepared on Stamp Paper of Rs.100/- duly attested by Notary

Annex 3 (Undertaking by tenderer)

I/We undertake and confirm that "for modifications/deviations to Conditions of Contract / Technical Specifications no price information is indicated in Cover 1 and 2.

I/We understand that if this Undertaking is found to be incorrect, our tender may not be considered for Evaluation in future for financial evaluation, for which I/WE shall be liable for all consequences and / or damages.

Signature

With Seal

Full Name _____

Designation_____

Address _____

(Authorized representative)

Annex 4 (Declaration – under the official Secrets Act)

Declaration – Under the official Secrets Act

"I/We hereby declare that I/We shall treat the tender documents, drawings and other records, connected with the work, as secret confidential documents and shall not communicate information derived there from to any person other than a person to whom I/We am/are authorized to communicate the same or use the information in any manner prejudicial to the safety of the same".

I/We understand that failure to observe the secrecy of the tenders will render the tender, liable to summary rejection.

Signature

With Seal

Full Name _____

Designation_____

Address _____

(Authorized representative)

Annex 5 (Declaration)

Declaration

1.
I/We _____ the undersigned, hereby certify that I/We have read, understood all the terms and conditions given in the tender document, including those in the addenda issued by the Department and the same are acceptable to us without any deviations.

If this declaration is found to be incorrect then without prejudice to any other action that may be taken, my/our security may be forfeited in full & the tender, if any to the extent accepted may be cancelled.

Signature

With Seal

Full Name _____

Designation_____

Address _____

(Authorized representative)

Annex 6 (Form of Agreement)

Form of Agreement

THIS Agreement made the _____ day of _____20_____ between the Executive Engineer, PHED District Rural Division II, Bikaner, (hereinafter called PHED) on behalf of the Governor of Rajasthan of the one part and _____ of _____ (hereinafter called Contractor) of the other part.

WHEREAS the PHED is desirous for Subject: **Tender for "CONSTRUCTION & COMMISSIONING OF RCC OHSR 300 KL CAPACITY VILLAGE PALANA**, as per NIT No. ---------- (to be filled by the tenderer).

WHEREAS the PHED has accepted a tender by the Contractor for the execution, completion and maintenance of such work,

NOW THIS AGREEMENT WITNESSES as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the conditions of Contract hereinafter referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:
   a) Form of agreement
   b) Letter of award and any pre-award correspondence between Department and the Tenderer
   c) Tender documents contained in;
      - Vol-I : Conditions of Contract, Pre-qualification Schedules
      - Vol-II : Scope of Work and Technical Specification, Annexures
      - Vol-III : Tender Drawings
      - Vol-IV : Schedule of Prices
      - All addenda issued
   d) The Tender Offer
3. The signed and initialed Tender Documents shall be deemed to form and be read and construed as part of this Agreement.
4. In consideration of the payments to be made by the PHED to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the PHED to provide, execute, and to complete the work, remedy the defects, commission the work and maintain it in conformity in all respects with the provisions of the Contract.
5. The PHED hereby covenants to pay the Contractor in consideration of the provisions, execution, completion of the works, remedying of the defects therein and maintenance of the work the Contract Price or that sum as may become payable under the conditions of the Contract at the times and in the manner prescribed by the Contract.

6. The following are the salient data of the agreement:

- Contract sum Rs _____
- Security Deposit: Rs _____ (10 % of the payments)
- Time for completion: _____ Months

IN WITNESS thereof the parties to these present have hereto set and subscribed their respective hands the day, month and year first above written.

SIGNED for and on behalf of PHED

Executive Engineer **PHED District Rural Division II, Bikaner**	Witness

SIGNED for and on behalf of the Contractor

Authorized representative	Witness

Annex 7 (Model BG for EMD)

PRWA-87

[Rule 335 & 594 (iii)]

Form of Bank Guarantee Bond for Bid security in Excess of Rs Ten Lac

To,

The Governor of the state of Rajasthan

THROUGH EXECUTIVE ENGINEER, PHED, DISRICT RURAL DN. II, BIKANER

Whereas the Governor of the state of Rajasthan through The Executive Engineer, PHED district rural Dn. II, Bikaner (here in after called "the department") has called the tender for execution of the work of "Subject:**Tender for "CONSTRUCTION & COMMISSIONING OF RCC OHSR 300 KL CAPACITY VILLAGE PALANA**", estimated to cost Rs..... (Rupees..... only) on .....(date) or any extended date as per normal rules of the Government, Bid security is to be deposited along with the tender, and whereas , the rules of the State Government permit deposit of Bid security up to Rs 10 lacs in cash, and the balance in the form of bank guarantee.

1- In consideration of the Governor of state of Rajasthan having made such a stipulation in rule 595 (iii) (a) of the public works financial and accounts rules and M/s …… (name of contractor) are desirous of depositing Bid security in excess of Rs 10 lacs i.e. Rs …… (Rupee …… only) (excess over Rs 10 lacs) in the form of bank guarantee as Bid security in order to participate in the tender for work above mentioned as per said rules, and will be so permitted on production of a bank guarantee for Rs …….. (Rupee …… only), we …… (indicate name of bank), here in after referred to as the 'bank' at the request of M/s …….. contractor(s), do hereby undertake to pay to the department an amount not exceeding Rs …… (Rupee …… only) on demand.

2- We …… (indicate the name of bank), do hereby undertake to pay Rs …….. only) the amounts due and payable under this guarantee without any demur or delay, merely on a demand from the department. Any such demand made on the bank by the department shall be conclusive and payable by the bank under this guarantee. The bank guarantee shall be completely at the disposal of the department and we …… (indicate the name of bank), bound ourselves with all directions given by department regarding this bank guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs …….. (Rupee ……only)

3- We …… (indicate the name of bank), under take to pay the department any money so demanded notwithstanding any dispute or disputes raised by the contractor(s) in any suit or proceeding pending before any court or tribunal or arbitrator etc relating thereto, our liability under these presents being absolute, unequivocal and unconditional.

4- We …… (indicate the name of bank) further agree with department that the department shall have the fullest liberty without our consent and without affecting in any manner our obligations, here under to extend the date of receipt of such tenders for the work as aforesaid or to vary any other terms and conditions of the notice inviting tenders or the tender, extend the validity of tenders or time for completion of works etc. we shall not be relieved from our liability by reason of any such variation or extension or for any forbearance, act or omission on the part of the department or any indulgence by the department, to the said contractor(s) or by any such matter or thing whatsoever which would but for this provision, have the effect of so relieving us

5- The liability of us …….. (indicate the name of bank), under this agreement will not be discharged due to the change in the constitution of the bank or the contractor(s)
6- We …… (indicate the name of bank), lastly undertake not to revoke this guarantee except with the previous consent of the department in writing.
7- This guarantee shall remain valid and in full effect, until it is decided to be discharged by the department. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs …… (Rupee …… only)
8- It shall not be necessary for the state department to proceed against the contractor before proceeding against the bank and the guarantee herein contained shall be enforceable against the bank notwithstanding any security which the state department may have obtained or obtain from the contractor.
9- The bank guarantee shall be payable at the head quarters of the division, or the nearest district head quarters. If the last date of expiry of the bank guarantee happens to be a holiday of the bank, the bank guarantee shall expire on the close of the next working day.

Dated…….day of ……for and on behalf of the bank (indicate the bank)

Signature and Designation

The above guarantee is accepted by the department of the state of Rajasthan for and on behalf of the Governor of state of Rajasthan

Signature

Annex 8 (Model BG for SD)

RPWA 88 A

(Rules 338 & 595(iii) c)

Model of the Security Deposit Guarantee

To

The Governor of the State of Rajasthan

Through, PHED, Executive Engineer PHED District Rural Dn. II, Bikaner

Whereas the Governor of the State of Rajasthan through Executive Engineer PHED District Rural Dn. II, Bikaner (here-in-after called "the Department") having entered into an agreement No___ dated ____ with M/s _____ (herein after called the contractor) for execution of the work of Subject: **Tender for "CONSTRUCTION & COMMISSIONING OF RCC OHSR 300 KL CAPACITY VILLAGE PALANA**" herein after called "the said Agreement" under which the contractor(s) M/s _____ have applied to furnish Bank Guarantee to makeup the full Security Deposit.

1. In consideration of the Governor of State of Rajasthan having made such a stipulation in agreement. We _____ (indicate name of the "Bank"), here-in-after referred to as the "Bank" at the request of M/s _____, contractor(s), do hereby undertake to pay to the Department an amount not exceeding Rs. _____ (Rupees _____ only) on demand.
2. We _____ (indicate the name of Bank), do hereby undertake to pay Rs. _____ only) under this guarantee without any demur or delay, merely on a demand from the Department. Any such demand made on the bank by the Department shall be conclusive and payable by the Bank under this guarantee. The Bank Guarantee shall be completely at the disposal of the Department and We _____ (indicate the name of Bank), bound ourselves with all directions given by Department regarding this Bank Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs_____ (Rupees_____ only).
3. We _____ (indicate the name of Bank), undertake to pay to the Department any money so demanded notwithstanding any dispute or disputes raised by the contractor(s) in any suit or proceeding pending before any Court or Tribunal or Arbitrator etc. relating thereto, our liability under these presents being absolute, unequivocal and unconditional.
4. We_____ (indicate the name of Bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue enforceable till all the dues of the Department under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till the Department certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said contractor(s) and accordingly discharges this guarantee.
5. We_____ (indicate the name of Bank) further agree with the Department that the Department shall have the fullest liberty without our consent and without affecting in any manner our obligations, hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Department against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said contractor(s) or for any forbearance act of omission on the part of the Department or any indulgence by the Department to the said contractor or by any such matter or thing whatsoever which would but for this provision, have effect of so reliving us.
6. The liability of us_____ (indicate the name of Bank), under this guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).
7. We _____ (indicate the name of Bank), lastly undertake not to revoke this guarantee except with the previous consent of the Department in writing.

8. This Guarantee shall remain valid and in full effect, until it is decided to be discharged by the Department. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs_____ (Rupees _____ only).
9. It shall not be necessary for the State Department to proceed against the contractor before proceeding against the Bank and the guarantee herein contained shall be enforceable against the Bank notwithstanding any security which the State Department may have obtained or obtain from the contractor.
10. The Bank Guarantee shall be payable at the headquarters of the Division, or the nearest District Headquarters. If the last date of expiry of the Bank Guarantee happens to be a holiday of the Bank, the Bank Guarantee shall expire on the close of the next working day.

Dated _____ day of _____ for and on behalf of the Bank (indicate the Bank)

Signature & Designation

The above Guarantee is accepted by the Department of the State of Rajasthan

For and on behalf of the Governor of State of Rajasthan

Signature

Note: Guarantee to be made on stamp paper purchased by the bank only.

Annex 9 : **Grievance Redressal during Procurement**

Grievance Redressal during Procurement
(as per Rajasthan Transparency in public procurement rule, 2013)

The designation and address of the First Appellate Authority is Additional **Chief Engineer, PHED, Region Bikaner**

The designation and address of the Second Appellate Authority is **Chief Engineer PHED (R) Rajasthan, Jaipur**.

(1) Filing an appeal

If any Bidder or prospective bidder is aggrieved that any decision, action or omission of the Procuring Entity is in contravention to the provisions of the Act or the Rules or the Guidelines issued there under, he may file an appeal to First Appellate Authority, as specified in the Bidding Document within a period of ten days from the date of such decision or action, omission, as the case may be, clearly giving the specific ground or grounds on which he feels aggrieved:

Provided that after the declaration of a Bidder as successful the appeal may be filed only by a Bidder who has participated in procurement proceedings:

Provided further that in case a Procuring Entity evaluates the Technical Bids before the opening of the Financial Bids, an appeal related to the matter of Financial Bids may be filed only by a Bidder whose Technical Bid is found to be acceptable.

(2) The officer to whom an appeal is filed under para (1) shall deal with the appeal as expeditiously as possible and shall endeavour to dispose it of within thirty days from the date of the appeal.

(3) If the officer designated under para (1) fails to dispose of the appeal filed within the period specified in para (2), or if the Bidder or prospective bidder or the Procuring Entity is aggrieved by the order passed by the First Appellate Authority, the Bidder or prospective bidder or the Procuring Entity, as the case may be, may file a second appeal to Second Appellate Authority specified in the Bidding Document in this behalf within fifteen days from the expiry of the period specified in para (2) or of the date of receipt of the order passed by the First Appellate Authority, as the case may be.

(4) Appeal not to lie in certain cases

No appeal shall lie against any decision of the Procuring Entity relating to the following matters, namely:-

(a) determination of need of procurement;
(b) provisions limiting participation of Bidders in the Bid process;
(c) the decision of whether or not to enter into negotiations;
(d) cancellation of a procurement process;
(e) applicability of the provisions of confidentiality.

(5) Form of Appeal

(a) An appeal under para (1) or (3) above shall be in the annexed Form along with as many copies as there are respondents in the appeal.
(b) Every appeal shall be accompanied by an order appealed against, if any, affidavit verifying the facts stated in the appeal and proof of payment of fee.
(c) Every appeal may be presented to First Appellate Authority or Second Appellate Authority, as the case may be, in person or through registered post or authorized representative.

(6) Fee for filing appeal

(a) Fee for first appeal shall be rupees two thousand five hundred and for second appeal shall be rupees ten thousand, which shall be non-refundable.
(b) The fee shall be paid in the form of bank demand draft or banker's cheque of a Scheduled Bank in India payable in the name of Appellate Authority concerned.

(7) Procedure for disposal of appeal

(a) The First Appellate Authority or Second Appellate Authority, as the case may be, upon filing of appeal shall issue notice accompanied by copy of appeal, affidavit and documents, if any, to the respondents and fix date of hearing.

(b) On the date fixed for hearing, the First Appellate Authority or Second Appellate Authority, as the case may be, shall –

  (i) hear all the parties to appeal present before him; and

  (ii) Peruse or inspect documents, relevant records or copies thereof relating to the matter.

(c) After hearing the parties, perusal or inspection of documents and relevant records or copies thereof relating to the matter, the Appellate Authority concerned shall pass an order in writing and provide the copy of order to the parties to appeal free of cost.

(d) The order passed under sub-clause (c) above shall also be placed on the State Public Procurement Portal.

FORM NO. 1.

(See rule 83)

MEMORANDUM OF APPEAL UNDER THE RAJASTHAN TRANSPARENCY IN PUBLIC PROCUREMENT ACT, 2012

Appeal No ..... of ……

Before the …… (First/ Second Appellate Authority)

1. Particulars of appellant:
   (i) Name of the appellant:
   (ii) Official address, if any:
   (iii) Residential address
2. Name and address of the respondent(s)
   (i)
   (ii)
   (iii)
3. Number and date of the order appealed against and name and designation of the officer/ authority who passed the order (enclose copy), or a statement of a decision, action or omission of the Procuring Entity in contravention to the provisions of the Act by which the appellant is aggrieved:
4. If the Appellant proposes to be represented by a representative, the name and postal address of the representative:
5. Number of affidavits and documents enclosed with the appeal:
6. Grounds of appeal:……

   ……

   ……

   ..... (Supported by an affidavit)

7. Prayer :

   ……

   ……

   …..

Place: ……

Date : …….

Appellant's Signature …….

PRE-QUALIFICATION SCHEDULES

PREAMBLE TO SCHEDULES

Tenderers are required to provide complete information asked in the schedules. No schedule or item of schedule is to be left blank. In case, a particular schedule or item in schedule is not applicable, the same should be clearly indicated. The information provided in the schedules shall be used for Pre-Qualification evaluation of the tenders to assess the suitability and conformity of the firm/offer. However, it is clarified that, whatever technical particulars are proposed or considered by the Tenderer for his financial offer, all the equipment to be finally provided, in case of award, shall correspond to the specifications of the tender documents and shall be subject to the approval of the Engineer-in-Charge as stipulated in Clause no.9. of Special Conditions of Contract Part 'A' in Vol.-I of the tender documents. No claim for additional payments shall be entertained during the course of the approval process or thereafter on this account.

It is expected that the tenderer will quote with a view to supply equipment of best makes and conforming to the highest standards. Tenderer has to consider for his financial offer, makes specified in the document. For items not covered by the list of equipment for which makes are specified or if the specifications are not specified in the tender document, only makes of reputed manufacturers of equipment corresponding to the state of art technology and / or to the latest Indian standards shall be supplied after approval of Engineer in Charge.

Information provided by the tenderer in the schedules is for preliminary assessment of the offer. However, these details are subject to approval of the Engineer-in-Charge based upon the detailed drawings / designs / data-sheets / specifications to be submitted by the tenderer in conformity with the tender documents.

Signature of authorised representative.....

Schedule - 1 (Tender Forms)

The Tenderer has to fill in all tender forms (if applicable) in this document and to submit them duly signed and stamped. They shall be used for the evaluation of his offer, the assessment whether his tender is substantial and for his pre-qualification.

The Tenderer shall neither add nor delete the texts of the forms. This might lead to the rejection of the tender. The papers shall remain bound in the tender document issued to the Tenderer. The supporting papers as indicated in Part B, Section 2 of the tender documents shall be bound in a box file, in the same order as they appear hereafter.

Tender forms and supporting papers required

Designation	What to do?	Supporting papers
Tender Letter	to be filled in, signed and stamped	
Statement having read TD and addenda	to be filled in, signed and stamped	
General information about the tenderer	to be filled in, signed and stamped	Powers of attorney, attested by notary on stamp paper of Rs 500; Bid security in required form; Evidence of experience of firm in similar jobs; Certificates of clearance of tax on sale and purchase of goods;
Tender Letter, Letter for Tender for Work, Declarations & Undertakings	to be filled in, signed and stamped	
Pre Qualification	to be filled in, signed and stamped	Pre-qualification criteria

Signature of authorized representative.....

Schedule – 2 (Statement having read the tender document)

We declare that we have read and understood and that we accept all clauses, conditions, descriptions, drawings of the tender documents and subsequent addenda (if any) without any change, reservations and conditions.

Tender documents purchased from PHED

Section	Part	Total pages*
Volume I		
	Notice of Invitation to Tenderers (NIT)	
	Instructions and guidance to Tenderers, schedules	
	Pre-Qualification Schedules	
	General Conditions of Contract	
	Special Conditions of Contract – Part A	
	Special Conditions of Contract – Part B	
Volume – II;	Scope of work & Specifications, Annexures	
Volume – III;	Tender Drawings	
Volume – IV;	Schedule of Prices	

Addenda issued by PHED*

Addendum No.	Dated

***TO BE FILLED IN BY THE TENDERER**

Signature of authorized representative.....

Schedule – 3 (For pre-qualification of firms)

Technical criteria :

3.1 Experience of Project Execution :- The bidder should have experience of the following works related to drinking water supply schemes/projects during last 7 years upto the date of submission of tenders:

"Execution and successful commissioning of completed work costing not less than the amount equal to Rs. 25.73 lacs (15% of the estimated cost)". The detail of the qulifying work(s) shall be submitted in the following format along with the technical bid.

S. N.	Name of Project/ Contract	Name of client	Work order No./ date / amount	Date of start of project	Date of completion of project	Amount of completed work	Completion certificate issuing authority/ no./ date	Refernce of documentary proof		Detail of work completed under the project		
								W.O. (enclosed at page no.)	Completion certificate (enclosed at page no.)	Item	No. / Dia	Capacity/ length
1	2	3	4	5	6	7	8	9	10	11	12	13
										Pipe line		
										RCC CWR		
										RWR		

Note :

- The period of 7 years shall be counted from 2005-06 to 2011-12 or thereafter upto date of submission of tender.
- Client Certificate towards satisfactory completion of work from officer not below the rank of Executive Engineer or its equivalent should be attached in respect of each work.
- The tenderer shall keep original certificates with him for verification and will present, if required, at a short notice of 3 days to the department.

Company Seal
Tenderer's Authorised Signature

3.2 Experience of Pipe lines

Laying, Jointing, Testing and commissioning of any type of pipeline of min. dia equal to 75% of dia (200 mm) of maximum size of pipeline to be laid under the contract for 1/3rd of its length, with minimum length of pipeline of all diameters equal to 1/3rd of the total length of pipeline under the contract but maximum length limited to 100 KM.

The detail of the qualifying work(s) shall be submitted in the following format along with the technical bid.

(Pre Qualification Criteria as in Clause 4 Bof ITT)

S. N	Name of Project/ Contract	Name of Client	Work Order No/ date/ amount	Date of start of Project	Date of Completion of project	Amount of completed work	Completion certificate issuing authority/ no/ date	Reference of documentary proof		Detail of work completed under the project		
								Work Order (enclosed at page No)	Completion certificate (enclosed at page No)	Pipe Dia in MM	Type (DI/ AC/ MS/ PVC/ PE/ PSCC etc) & class	Length (meter)

The period of 7 years shall be counted up to date of submission of tender.

NOTE (for schedule 3.1 and 3.2)

1. Client Certificate towards satisfactory completion of work from Competent Authority (Engineer In charge, not below the rank of Executive Engineer) should be attached in respect of each work in *Format at schedule 3.4* along with copy of work order.
2. The tenderer shall keep original certificates with him for verification and will present, if required, at a short notice of 3 day to the department.

Company Seal **Tenderer's Authorised Signature**

3.3. RCC OHSR & RCC CWR:

"Execution and commissioning of a RCC OHSR of each capacity equal to or more than 100.00 KL capacity"

The detail of the qualifying work(s) shall be submitted in the following format along with the technical bid.

(Pre Qualification Criteria as in Clause 2.2 of ITT)

S.N	Name of Project/ Contract	Name of Client	Work Order No/ date/ amount	Date of start of Project	Date of Completion of project	Amount of completed work	Completion certificate issuing authority/ no/ date	Reference of documentary proof		Detail of work completed under the project	
								Work Order (enclosed at page No)	Completion certificate (enclosed at page No)	Item	Capacity
										OHSR	

NOTE:

The period of 7 years shall be counted up to date of submission of tender.

Client Certificate towards satisfactory completion of work from officer not below the rank of Executive Engineer or its equivalent should be attached in respect of each work.

The tenderer shall keep original certificates with him for verification and will present, if required, at a short notice of 3 day to the department.

Company Seal **Tenderer's Authorised Signature**

Schedule 3.4 Model format for Work Experience certificate

Work Experience Certificate

Certified that M/s……...have successfully completed and commissioned the work awarded vide work order number…….dated……. against NIT No. ……. dated ……. of ….. *(Name of authority)*…….. as per following details:-

a	Name of work		
b	Stipulated date of completion		
c	Actual Date of completion		
d	Work order Amount		
e	Actual amount of work as executed as per final bill		
f	Components executed in the work		
	S No	Name of Component	Size/Quantity/Capacity of components executed
	1		
	2		
	3		
	4		

The work was found satisfactory.

Date:-

Place:-

Signature & Seal of Engineer In Charge

(Not below the rank of Executive Engineer)

Schedule - 4.1 (Undertakings & Deviations)

4.1 Undertaking

Undertaking in respect of the Tender for "**CONSTRUCTION & COMMISSIONING OF RCC OHSR 300 KL CAPACITY VILLAGE PALANA**" herein", as per NIT No. ---------- (to be filled by the tenderer)

I/We hereby agree to all terms and conditions, scope of work, specifications except to the deviation given in schedule 4.2 and 4.3. We undertake that the contents of the submitted tenders, the write-up given, the designs attached herein and the figures/components shown in the drawings submitted with the tender, do not provide any deviations from the terms and conditions, scope of work and specifications.

I/we agree to withdraw all such deviations which indicates any deviation from the terms and conditions, scope of work and specifications other than those given in Schedule 4.2 and 4.3, which can be interpreted from the write up, attached designs, schedules, drawings etc. given in the submitted tender

I/we also agree to provide the equipment / material specified in the approved vendor list / tender document without any additional cost for completion of the work.

I/We understand that the Department can ask us to provide any additional equipment as shown in the drawings or as written in the tender document without any additional cost. I/We also understand that the department may also opt to provide any of the equipment of other makes / specifications quoted by us in the tender document without providing us any opportunity to change the financial offer, without having any effect on the Department right to ask us to supply material of specifications and makes as per the tender document.

I/We also agree that irrespective to the designs and drawings given in this tender offer, we shall execute the work as per the designs and drawings approved by the Engineer in Charge during execution, in consideration to the provisions of the Tender Document.

I/We have already considered excise exemption as per Central Govt.'s notification before quoting the offer for this work and will not claim for any payment due to statutory variance towards any taxes, duties, levies etc.

Company Seal **Tenderer's Authorised Signature**

Schedule- 4.2 (Deviation from Technical Specifications)

All deviations from Technical Specifications shall be filled in by the Tenderer, clause by clause, in this Schedule. It may be noted that the Specifications given in the Vol.-II of Tender Document are the minimum acceptable; the tenderers are free to quote standards that are better / higher than the ones referred to in the Tender Document.

Clause Ref. of Vol.- II	Specification	Deviation	Standard to Which offered material / equipment confirms

The tenderer hereby certifies that the above mentioned are the only deviations from Technical Specifications of the Tender and he accepts all the remaining scope and specifications contained in Vol.-II of the Tender document.

Company Seal **Tenderer's Authorised Signature**

Schedule - 4.3 (Deviaition from Conditions of Contarct)

All deviations from the Conditions of Contract (General Conditions of Contract and Special Conditions) shall be filled in by the Tenderer, clause by clause in this Schedule

Clause Ref. of Vol. - I	Deviation

The Tenderer hereby certificates that the above mentioned are the only deviations from the Conditions of Contract of Vol.-I and he agrees with all remaining conditions.

Company Seal **Tenderer's Authorised Signature**

Schedule - 4.4 Declaration by the Bidder regarding Qualifications **(as per Rajasthan Transparency in public procurement rule, 2013)**

Declaration by the Bidder

In relation to my/ our Bid submitted to …… for procurement of …… in response to their Notice Inviting Bids No..... Dated .....I / We hereby declare under Section 7 of Rajasthan Transparency in Public Procurement Act, 2012, that :

1. I/ we possess the necessary professional, technical, financial and managerial resources and competence required by the Bidding Document issued by the Procuring Entity;
2. I/ We have fulfilled my/ our obligation to pay such of the taxes payable to the Union and the State Government or any local authority as specified in the Bidding Document.;
3. I / we are not insolvent, in receivership, bankrupt or being wound up, not have my/ our affairs administered by a court or a judicial officer, not have my/ our business activities suspended and not the subject of legal proceedings for any of the foregoing reasons;
4. I / we do not have, and our directors and officers not have, been convicted of any criminal offence related to my/ our professional conduct or the making of false statements or misrepresentations as to my/ our qualifications to enter into a procurement contract within a period of three years preceding the commencement of this procurement process, or not have been otherwise disqualified pursuant to debarment proceedings;
5. I / we do not have a conflict of interest as specified in the Act, Rules and the Bidding Document, which materially affects fair completion;

Date:
Place:

Signature of bidder
Name :
Designation :
Address :

General Conditions of Contract

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Tender for works

I/We hereby tender for the "Subject: **Tender for "**CONSTRUCTION & COMMISSIONING OF RCC OHSR 300 KL CAPACITY VILLAGE PALANA" for the Governor of the State of Rajasthan of the work specified in the underwritten memorandum within the time specified in such memorandum at Lump Sum amount specified in the Schedule attached in tender document. I/We have visited the site of work and am/are fully aware of all the difficulties and conditions likely to affect carrying out the work. I/We have fully acquainted myself/ourselves about the conditions in regard to accessibility of site and quarries/kilns, nature and the extent of ground, working conditions including stacking of materials, installation of tools & Plant, conditions effecting accommodation and movement of labour etc required for the satisfactory execution of contract.

Memorandum

General description of work..- "CONSTRUCTION & COMMISSIONING OF RCC OHSR 300 KL CAPACITY VILLAGE PALANA" as per details in "Scope of Work" and Specification for Works.

(a) Estimated cost — Rs. 42.00 Lacs

(b) Earnest money — Rs 84000.00 @ 2% for enlisted contractors outside their zone of enlistment and Rs 21,000.00 @ 1/2% within their zone of enlistment

(c) Security Deposit:

(i) "The security deposit @ 10% of the gross amount of the running bill shall be deducted from each running bill and shall be refunded as per rules on completion of the contract as per terms and conditions. The earnest money deposited shall however be adjusted while deducting security deposit from the first running bill of the contractor. There will be no maximum limit of security deposit.

A contractor may, however, elect to furnish bank guarantee or any acceptable form of security for an amount equal to the full amount of security deposit @ 10% of the work order before or at the time of executing the agreement. In that case earnest money may be refunded only after furnishing of the bank guarantee as above. During the execution of the work or after completion of the work also a contractor may replace the security deposit by furnishing bank guarantee for an equal amount. However, during execution of the work if cost of work exceeds as shown at the time of furnishing bank guarantee, balance security deposit shall be deducted from the Running Account Bills."

If the contractor during the course of execution of the work or after completion of the work desires to replace the security deposit paid in cash or deducted from running bills by bank guarantee, he may be allowed to furnish a bank guarantee in the prescribed form for the required amount and period and after accepting of such bank guarantee the amount of such security deposit earlier deposited/deducted may be refunded.

(ii) Bank Guarantee shall in all cases be payable at the headquarter of the Division or the nearest District Headquarters.

(d) Time allowed for the completion of work (to be reckoned from the 10th day after the date of written order to commence the work) is 6 months.

Should this tender be accepted in whole or in Part, I/We hereby agree to abide by and fulfill all the terms and provisions of the conditions of contract annexed hereto and of the detailed notice for technical and financial bids, or in default thereof, to forfeit and pay to the Governor of Rajasthan or his successors in office, the sum of money mentioned in the said conditions.

A sum of Rs. ……..lacs is forwarded herewith in the form of Cash, Bank Draft, Bankers Cheque as Earnest Money. This amount of earnest money shall absolutely be forfeited to the Governor of Rajasthan or his successor in office without prejudice to any other right or remedies of Governor of Rajasthan or his office, should I/We fail to commence the work specified in the above memorandum.

Signature of Witness Signature of Contractor

Witness's address & occupation Address of Contractor

Date

The above tender is hereby accepted by me on behalf of the Governor of Rajasthan

Dated the _____ Engineer-in-charge

GENERAL CONDITIONS OF CONTRACT

Clause 1: Security Deposit

"The security deposit @ 10% of the gross amount of the running bill shall be deducted from each running bill and shall be refunded as per rules on completion of the contract as per terms and conditions. The earnest money deposited shall however be adjusted while deducting security deposit from the first running bill of the contractor. There will be no maximum limit of security deposit.

A contractor may, however, elect to furnish bank guarantee or any acceptable form of security for an amount equal to the full amount of security deposit @ 10% of the work order before or at the time of executing the agreement. In that case earnest money may be refunded only after furnishing of the bank guarantee as above. During the execution of the work or after completion of the work also a contractor may replace the security deposit by furnishing bank guarantee for an equal amount. However, during execution of the work if cost of work exceeds as shown at the time of furnishing bank guarantee, balance security deposit shall be deducted from the Running Account Bills."

If the contractor during the course of execution of the work or after completion of the work desires to replace the security deposit paid in cash or deducted from running bills by bank guarantee, he may be allowed to furnish a bank guarantee in the prescribed form for the required amount and period and after accepting of such bank guarantee the amount of such security deposit earlier deposited/deducted may be refunded.

All compensation or other sums of money payable by the Contractor to Government under the terms of his contract may be deducted from or paid by the sale of a sufficient part of his Security Deposit, or from interest arising therefrom, or from any sums, which may be due or may become due to the Contractor by the Government on any account whatsoever, and in the event of his Security Deposit being reduced by reason of any such deduction or sale as aforesaid, the Contractor shall within ten days thereafter, make good in cash or Bank Guarantee of Nationalised/Scheduled bank, as aforesaid, any sum or sums which may have been deducted from or raised by sale of his Security Deposit or any part thereof.

In case of Bank Guarantee of any Nationalised/Scheduled Bank is furnished by the Contractor to the Government, as part of the Security Deposit and the bank goes into liquidation or, for any reason is unable to make payment against the said Bank Guarantee, the loss caused thereby shall fall on the Contractor and the Contractor shall forthwith, on demand, furnish additional security to the Government to make good the deficit.

The liability or obligation of the bank under the Guarantee Bond shall not be affected or suspended by any dispute between the Engineer-in-Charge and the Contractor, and the payment, under the Guarantee Bond by the bank to the Government shall not wait till disputes are decided. The bank shall pay the amount under the Guarantee, without any demur, merely on a demand from the Government stating that the amount claimed is required to meet the recoveries due or likely to be due from the Contractor. The demand, so made, shall be conclusive as regards to amount due and payable by the bank, under the guarantee limited to the amount specified in the Guarantee Bond. The guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor.

The Bank Guarantee shall remain valid upto the specified date unless extended on demand by the Engineer-in-Charge which shall include the period of completion of the contract and the defect removal period as per terms of the Agreement. Bank's liability shall stand automatically discharged unless a claim in writing is lodged with the Bank within the period stated in the Bank Guarantee including the extended period. After satisfactory completion of the contract and clearance of all dues by the Contractor, the Chief Engineer or duly authorised Engineer will discharge the Bank Guarantee after expiry of the original or the extended period, as the case may be. In case the date of expiry of the Bank Guarantee is a holiday, it will be deemed to expire on the close of the next working day.

Government is not concerned with any interest accruing to the Contractor on any form of Security (primary or collateral) lodged by him with the bank or any sums payable to sureties obtained by the Bank as counter guarantee to secure its own position. These will be the matters between the Bank and the Contractor.

Clause 2: Compensation for delay

The time allowed for carrying out the work as entered in the tender, shall be strictly observed by the Contractor and shall be reckoned from the 10th day after the date of written order to commence the work is given

to the Contractor. If the Contractor does not commence the work within the period specified in the work order, he shall stand liable for the forfeiture of the amount of Earnest Money and Security Deposit. Besides, appropriate action may be taken by the Engineer-in-Charge/competent authority to debar him from taking part in future tenders for a specified period or black list him. The work shall, throughout the stipulated period of completion of the contract, be proceeded with all due diligence, time being essence of the contract, on the part of the Contractor. To ensure good progress during the execution of work, the contractor shall be bound, in all cases in which the time allowed for any work exceeds one month (save for special jobs), to complete 1/8th of the whole of the work before 1/4th of the whole time allowed under the contract has elapsed, 3/8th of the work before ½ of such time has elapsed and 3/4th of work before 3/4th of such time has elapsed. If the contractor fails to complete the work in accordance with this time schedule in terms of cost in money, and the delay in execution of work is attributable to the contractor, the contractor shall be liable to pay compensation to the Government at every time span as below: -

A.	Time Span of full stipulated period	1/4th	1/2th	3/4th	Full
B.	Work to be completed in terms of money	1/8th	3/8th	3/4th	Full
		(Rs. .....)	(Rs. .....)	(Rs. .....)	(Rs. .....)
C.	Compensation payable by the contractor for delay attributable to contractor at the stage of :	Delay up to one fourth period of the prescribed time span – 2.5% of the work remained unexecuted			
		Delay exceeding one fourth period but not exceeding half of the prescribed time span – 5% of the work remained unexecuted.			
		Delay exceeding half of the period but not exceeding three fourth of the prescribed time span – 7.5% of the work remained unexecuted			
		Delay exceeding three fourth of the prescribed time span – 10% of the work remained unexecuted			

Note: In case delayed period over a particular span is split up and is jointly attributable to Government and contractor, the competent authority may reduce the compensation in proportion of delay attributable to Government over entire delayed period over that span after clubbing up the split delays attributable to Government and this reduced compensation would be applicable over the entire delayed period without paying any escalation.

Following illustrations is given:-

(i) First time span is 6 months, delay is of 30 days which is split over as under:-

5 days (attributable to Government) + 5 days (attributable to contractor) + 5 days (attributable to Government) + 5 days (attributable to contractor) + 5 days (attributable to Government) + 5 days (attributable to contractor)

Total delay is thus clubbed to 15 days (attributable to Government) and 15 days (attributable to contractor).

The normal compensation of 30 days as per clause 2 of agreement is 2.5%, which can be reduced as 2.5*15/30-1.25% over 30 days without any escalation by competent authority.

Note : The compensation, levied as above, shall be recoverable from the Running Account Bill to be paid immediately after the concerned time span. Total compensation for delays shall not exceed 10 percent of the total value of the work.

The contractor shall, further, be bound to carry out the work in accordance with the date and quantity entered in the progress statement attached to the tender.

In case the delay in execution of work is attributable to the contractor, the spanwise compensation, as laid down in this clause shall be mandatory. However, in case the slow progress in one time span is covered up within original stipulated period, then the amount of such compensation levied earlier shall be refunded. The Price escalation, if any, admissible under clause 45 of Conditions of Contract would be admissible only on such rates and cost of work, as would be admissible if work would have been carried out in that particular time span. The Engineer-in-Charge shall review the progress achieved in every time span, and grant stagewise extension in case of slow progress with compensation, if the delay is attributable to contractor, otherwise without compen-

sation.

However, if for any special job, a time schedule has been submitted by the Contractor before execution of the agreement, and it is entered in agreement as well as same has been accepted by the Engineer-in-charge, the Contractor shall complete the work within the said time schedule. In the event of the Contractor failing to comply with this condition, he shall be liable to pay compensation as prescribed in forgoing paragraph of this clause provided that the entire amount of compensation to be levied under the provisions of this Clause shall not exceed 10% of the value of the contract. While granting extension in time attributable to the Government, reasons shall be recorded for each delay.

Clause 3: Risk & Cost Clause

The Engineer-in-charge or the Competent Authority defined under rules may, without prejudice to his rights against the Contractor, in respect of any delay or inferior workmanship or otherwise, or any claims for damages in respect of any breaches of the contract and without prejudice to any rights or remedies under any of the provisions of this Contract or otherwise, and whether the date for completion has or has not elapsed, by notice in writing, absolutely determine the Contract in any of the following cases:

(i) If the Contractor having been given by the Engineer-in-charge, a notice in writing to rectify, reconstruct or replace any defective work or that the work is being performed in any inefficient or otherwise improper or un-workman like manner shall omit to comply with the requirements of such notice for a period of seven days, thereafter, or if the Contractor shall delay or suspend the execution of the work so that either in the judgement of the Engineer-in-charge (which shall be final and binding) he will be unable to secure completion of the work by the date for completion or he has already failed to complete the work by that date,

(ii) If the Contractor, being a company, shall pass a resolution or the court shall make an order that the company shall be wound up or if a receiver or a manager, on behalf of a creditor, shall be appointed or if circumstances shall arise, which entitle the court or creditor to appoint a receiver or a manager or which entitle the court to make a winding up order,

(iii) If the contractor commits breach of any of the terms and conditions of this Contract,

(iv) If the contractor commits any acts mentioned in, clause 19 thereof.

When the Contractor has made himself liable for action under any of the cases aforesaid, the Engineer-in charge on behalf of the Governor of Rajasthan shall have powers: -

(a) To determine or rescind the contract, as aforesaid (of which determination or rescission notice in writing to the Contractor under the hand of the Engineer-in charge shall be conclusive evidence), upon such determination or rescission, the earnest money, full security deposit of the contract shall be liable to be forfeited and shall be absolutely at the disposal of Government.

(b) To employ labour paid by the Department and to supply materials to carry out the work or any part of the work, debiting the Contractor with the cost of the labour and the price of the materials (of the amount of which cost and price certified by the Engineer-in-charge shall be final and conclusive against the contractor) and crediting him with the value of the work done in all respects in the same manner and at the same rates, as if it had been carried out by the Contractor under the terms of this Contract. The certificate of the Divisional Officer, as to the value of the work done, shall be final and conclusive evidence against the Contractor provided always that action under the sub-clause shall only be taken after giving notice in writing to the Contractor. Provided also that; if the expenses incurred by the Department are less than the amount payable to the Contractor at his agreement rates, the difference shall not be paid to the Contractor.

(c) After giving notice to the contractor to measure up the work of the contractor and to take such part thereof, as shall be unexecuted out of his hands, and to give it to another contractor to complete, in which case any expenses which may be incurred in excess of the sum which would have been paid to the original contractor, if the whole work had been executed by him (of the amount of which excess, the certificate in writing of the Engineer-in-charge shall be final and conclusive) shall be borne and paid by the original Contractor and may be deducted from any money due to him by Government under this contract or on any other account whatsoever, or from his Earnest Money, Security Deposit, Enlistment Security or the proceeds of sales thereof, or a sufficient part thereof, as the case may be. In the event of any one or more of the above courses being adopted by the Engineer-in-charge, the Contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any materials or entered into any engagements or made any advances on account or with a view to the execution of the work or the performance of contract. And, in case

action is taken under any of provisions aforesaid, the Contractor shall not be entitled to recover or be paid, any sum for any work thereof or actually performed under this contract unless and until the Engineer-in-charge has certified, in writing, the performance of such work and the value payable in respect thereof, and he shall only be entitled to be paid the value so certified.

Clause 4: Contractor remains liable to pay compensation, if action not taken under clause 3

(i) In any case in which any of the powers conferred by clause 3 hereof, shall have become exercisable and the same shall have not been exercised, the non-exercise, thereof, shall not constitute waiver of any of the conditions hereof, and such power shall, not withstanding, be exercisable in the event of any future case of default by the Contractor for which, by any clause or clauses hereof, he is declared liable to pay compensation amounting to the whole of his Security Deposit /Earnest Money/Enlistment security and the liability of the Contractor for past and future compensation shall remain unaffected.

Powers to take possession of, or require removal, sale of Contractor's plant

(ii) In the event of the Engineer-in-Charge putting in force, powers vested in him under the preceding Clause 3 he may, if he so desires, take possession of all or any tools, plants, materials and stores, in or upon the works or the site, thereof or belonging to the contractor or procured by him and intended to be used for the execution of the work or any part thereof, paying or allowing for the same in account, at the contract rates or, in case of these not being applicable, at current market rates, to be certified by the Chief Engineer or duly authorized Engineer (whose certificate thereof, shall be final and conclusive), otherwise the Engineer-in-Charge may, by notice in writing to the contractor or his clerk of the works, foreman or other authorized agent, require him to remove such tools, plant, materials or stores from the premises (within a time to be specified in such notice), and in the event of the contractor failing to comply with any requisition, the Chief Engineer or other duly authorized Engineer may remove them at the contractor's expenses, sell them by auction or private sale on account of the Contractor and at his risk in all respects, and the certificate of the Chief Engineer or other duly authorized Engineer, as to the expense of any such removal, and the amount of the proceeds and expense of any such sale shall be final and conclusive against the Contractor.

Clause 5: Extension of time

If the contractor shall desire an extension of the time for completion of the work on the ground of his having been unavoidably hindered in its execution or on any other grounds, he shall apply, in writing, to the Engineer-in-Charge within 30 days of the date of the hindrance, on account of which he desires such extension as aforesaid, and the Authority Competent to grant extension under the rules/delegations of power or other duly authorized Engineer shall, if in his opinion, (which shall be final) reasonable grounds be shown therefor, authorise such extension of time, if any, as may, in his opinion, be necessary or proper, if the period of completion of contract expires before the expiry of the period of one month provided in this clause, the application for extension shall be made before the expiry of the period stipulated for completion of the contract. The competent authority shall grant such extension at each such occasion within a period of 30 days of receipt of application from contractor and shall not wait for finality of work. Such extensions shall be granted in accordance with provisions under clause (2) of this agreement.

Clause 5 A: Monthly Return of Extra Claims

Contractor has to submit a return every month for any work claimed as extra. The Contractor shall deliver the return in the office of the Executive Engineer and obtain Receipt Number of the Receipt Register of the day on or before 10th day of every month during the continuance of the work covered by this contract, a return showing details of any work claimed as extra by the contractor which value shall be based upon the rates and prices mentioned in the contract or in the Schedule of Rates in force in the District for the time being. The contractor shall be deemed to have waived all claims, not included in such return, and will have no right to enforce any such claims not included, whatsoever be the circumstances.

Clause 6: Final Certificate

On completion of the work, the contractor shall send a registered notice to the Engineer-in-charge, giving the date of completion and sending a copy of it to the officer accepting the contract, on behalf of the Governor and shall request the Engineer-in-charge to give him a certificate of completion, but no such certificate shall be

given nor shall the work be considered to be complete until the contractor shall have removed from the site on which the work shall be executed, all scaffolding, surplus materials and rubbish and cleared off the dirt from all wood work, doors, walls, floors, or other parts of any building in, upon or about which the work is to be executed or of which he may have possession for the execution thereof, he had filled up the pits. If the contractor shall fail to comply with the requirements of this Clause as to removal of scaffolding, surplus materials and rubbish and cleaning off dirt and filling of pits on or before the date fixed for completion of the work, the Engineer-in-charge may, at the expense of the contractor, remove such scaffolding, surplus materials, and the rubbish and dispose of the same, as he thinks fit, and clean off such dirt and fill the pits, as aforesaid, and the contractor shall forthwith pay the amount of all expenses, so incurred, and shall have no claim in respect of any such scaffolding or surplus materials, as aforesaid, except for any sum actually realised by the sale thereof. On completion, the work shall be measured by the Engineer-in-charge himself or through his subordinates, whose measurements shall be binding and conclusive against the contractor. Provided that, if subsequent to the taking of measurements by the subordinate, as aforesaid, the Engineer-in-charge had reason to believe that the measurements taken by his subordinates are not correct, the Engineer-in-charge shall have the power to cancel the measurements already taken by his subordinates and acknowledged by the Contractor and to take measurements again, after giving reasonable notice to the Contractor, and such re-measurements shall be binding on the Contractor.

Within thirty days of the receipt of the notice, Engineer-in-charge shall inspect the work and if there is no visible defects on the face of the work, shall give the Contractor, a certificate of completion. If the Engineer-in-charge finds that the work has been fully completed, it shall be mentioned in the certificate so granted. If, on the other hand, it is found that there are certain visible defects to be removed, the certificate to be granted by Engineer-in-charge shall specifically mention the details of the visible defects along with the estimate of the cost for removing these defects. The final certificate of work shall be given after the visible defects pointed out as above have been removed.

Clause 7: Payment on Intermediate Certificate to be regarded as advance

No payments shall be made for works estimated to cost less than rupees twenty five thousand, till after the whole of the works shall have been completed and a certificate of completion given. But in the case of works estimated to cost more than rupees twenty five thousand, the Contractor shall on submitting the bill therefore, be entitled to receive a monthly payment proportionate to the part, thereof, then approved and passed by the Engineer-in-charge, whose certificate of such approval and passing of sum, so payable, shall be final and conclusive. Running Account Bill shall be paid within 15 days from presentation. But all such intermediate payments shall be regarded as payments by way of advance against the final payment only and not as payments for work actually done and completed, and shall not preclude the requiring of bad, unsound and imperfect or unskillful work to be removed and taken away and re-constructed or re-erected, or considered as an admission of the due performance of the contract, or any part thereof, in any respect, or the accruing of any claim, nor shall it conclude, determine, or effect in any way the powers of the Engineer-in-charge under these conditions or any of them to the final settlement and adjustment of the accounts or otherwise or in any other way vary or affect the contract. The final bill shall be made/submitted by the Contractor within one month of the date fixed for completion of the work, otherwise the Engineer-in-charge's certificate of the measurement and of the total amount payable for the work accordingly shall be final and binding on all parties.

Clause 7A: Time Limit for Payments of Final Bills

The final bill shall be paid within 3 months on presentation by the contractor after issuance of final completion certificate in accordance with clause 6 of the conditions of contract. If, there shall be any dispute about any item(s) of the work, then the undisputed item(s) only, shall be paid within the said period of 3 months. If a final bill (which contains no disputed item or disputed amount of any item) is not paid within the period of three months from presentation of final bill or 6 months from the date of receipt of registered notice regarding completion of work in accordance with clause 6 of the conditions of the contract, the defects, if any, shall be brought to the notice of the higher authority. The period of 3 months shall commence from the date of rectification of the defects. The higher authority shall ensure that in no case final bill should be left unpaid after 9 months from the receipt of registered notice regarding completion of work. The contractor shall submit a memorandum of the disputed items along with justification in support within 30 days from the disallowance thereof, and if he fails to do so, his claims shall be deemed to have been fully waived and absolutely extin-

guished.

Clause 8: Bills to be submitted monthly

In case of lump sum contracts, bills will be submitted by the contractor on completion of various stages of work as specified in the contract document. The claim as far as admissible, authorized or paid, if possible, before expiry of 10 days from the presentation of the bill. The claims for additions and alterations, if any, may also be included in the bills if their measurements have been recorded and checked.

Clause 8A: Contractor to be given time to file objection to the Measurements recorded by the Department

Before taking any measurement of any work, as have been referred to in preceding Clauses 6, 7 & 8, the Engineer-in-charge or a subordinate, deputed by him, shall give reasonable notice to the Contractor. If the Contractor fails to be present at the time of taking measurements after such notice or fails to sign or to record the difference within a week from the date of measurement in the manner required by the Engineer-in-charge, then in any such event, the measurements taken by the Engineer-in-charge or by the subordinates deputed by him, as the case may be, shall be final and binding on the Contractor and the Contractor shall have no right to dispute the same.

Clause 8B: Recovery of Cost of Preparation of the Bill

In case of contractor of class A and AA donot submit the bill within time fixed, the Engineer in Charge may prepare the bill as per the provision of clause 8 of the general conditions of the contract but @ 0.5 % of amount of such a bill shall be made and credited to the general revenue on account of preparation of bill.

Clause 9: Bills to be on printed forms

The Contractor shall submit all bills on the printed forms, to be had on application, at the office of the Engineer-in-charge and the charges in the Bills shall always be entered at the rates specified in the tender or in the case of any extra work ordered in pursuance of these conditions, and not mentioned or provided for in the tender, at the rates hereinafter provided for such work.

Clause 9A: Payments of Contractor's Bills to Banks

Payments due to the Contractor may if so desired by him, be made to this Bank instead of direct to him, provided that the contractor has furnished to the Engineer-in-Charge(I)an authorization in the form of a legally valid document, such as a Power of Attorney conferring authority on the Bank to receive payments, and (ii) his own acceptance of the correctness of the account made out, as being due to him, by Government, or his signature on the bill or other claim preferred against

Government before settlement by the Engineer-in-Charge of the account or claim, by payment to the Bank. While the receipt given by such bank shall constitute a full and sufficient discharge for the payment, the Contractor should, whenever possible, present his bill duly receipted and discharged through his Banker. Nothing, herein contained, shall operate to create in favour of the Bank any rights vis-a-vis the Governor.

Clause 10: Stores supplied by Government

If the specification or estimate of the work provides for the use of any special description of material, to be supplied from Engineer-in-charge's stores, or if, it is required that contractor shall use certain stores to be provided by the Engineer-in-charge, specified in the schedule or memorandum hereto annexed, the contractor shall be bound to procure and shall be supplied such materials and stores as are, from time to time, required to be used by him for the purpose of the Contract only, and the value of the full quantity of materials and stores, so supplied, at the rates specified in the said schedule or memorandum, may be set off or which may be deducted from any sum, then due or thereafter become due, to the Contractor under the Contract or otherwise or against or from the Security Deposit or the proceeds of sale, if the same is held in Government securities, the same or sufficient portion thereof being in this case, sold for this purpose. All materials supplied to the contractor, either from Departmental stores or with the assistance of Government, shall remain the absolute

property of Government. The Contractor shall be trustee of the Stores/ Materials, so supplied/ procured, and these shall not, on any account, be removed from the site of work and shall be, all times, open to inspection by the Engineer-in Charge. Any such material, unused and in perfectly good condition at the time of completion or determination or rescinding of the contract, shall be returned to the Divisional officer's Stores, if, by a notice in writing under his hand, he shall so require, and if on service of such notice, the contractor fails to return the materials, so required, he shall be liable to pay the price of such materials in accordance with provision of clause 10 B ibid. But the contractor shall not be entitled to return any such materials, unless with such consent, and shall have no claim for compensation on account of any such materials, so supplied to him as aforesaid being unused by him, or for any wastage in or damage to any such materials. For the stores returned by the contractor, he shall be paid for, at the price originally charged excluding storage charges, in case of materials supplied from departmental stores and actual cost including freight, cartage, taxes etc., paid by the Contractor, in case of supplies received with the assistance of Government, which, however, should in no case exceed market rate prevailing at the time the materials are taken back. The decision of the Engineer-in-charge, as to the price of the stores returned, keeping in view its condition etc., shall be final and conclusive. In the event of breach of the aforesaid condition, the Contractor shall, in addition to throwing himself open to account for contravention of the terms of the license or permit and/or for criminal breach of trust, pay to the Government, all advantages or profits resulting, or which in the usual course, would result to him by reason of such breach. Provided that the Contractor shall, in no case be entitled to any compensation or damage on account of any delay in supply, or non–supply thereof, all or any such materials and stores.

Clause 10A: Rejection of materials procured by the Contractor

The Engineer-in-Charge shall have full powers to require the removal from the premises of all materials which in his opinion, are not in accordance with the specifications and, in case of default, the Engineer-in-Charge shall be at liberty to employ other person(s) to remove the same without being answerable or accountable for any loss of damage, that may happen or arise to such materials to be substituted thereof, and in case of default, Engineer-in-Charge may cause the same to be supplied and all costs, which may attend such removal and substitution, are to be born by the Contractor.

Clause 10B: Penal rate in case of excess consumption

The Contractor shall also be charged for the materials consumed in excess of the requirements calculated on the basis of standard consumption approved by the department, at double of the issue rate including storage and supervision charges or market rate, whichever is higher. A Material Supply and Consumption Statement, in precribed Form RPWA 35A shall be submitted with every Running Account Bill, distinguishing material supplied by the Government and material procured by the Contractor himself. The recovery for such material shall be made from Running Account Bill next after the consumption and shall not be deferred. Certificate of such nature shall be given in each Running Account Bill.

Clause 10 C: Hire of Plant and Machinery

Special Plant and Machinery, required for execution of the work, may be issued to the Contractor, if available, on the rates of hire charges and other terms and conditions as per departmental Rules, as per Schedule annexed to these conditions. Rates of such Plant & Machinery shall be got revised periodically so as to bring them at par with market rate.

Clause 11: Works to be executed in accordance with specifications, Drawings, Orders etc.

The Contractor shall execute the whole and every part of the work in the most substantial and satisfactory manner and both as regards materials and otherwise in every respect, in strict accordance with the Specifications. The Contractor shall also conform exactly fully and faithfully to the designs, drawings (either designed by department or designed by contractor and approved by Engineer-in-charge during additional execution) and instructions in writing relating to the work signed by the Engineer-in-charge and lodged in his office and to which the Contractor shall be entitled to have access at such office or on the site of the work for the purpose of inspection during office hours and the Contractor shall, if he so require, be entitled, at his own expense, to make or cause to be made copies of specifications and of all such designs, drawings and instructions, as aforesaid. A certificate of executing works as per approved design, specifications etc. shall be given on each Running

Account Bill.

The specifications of work, material, methodology of execution, drawings and designs shall be signed by the Contractor and Engineer-in-charge while executing agreement and shall form part of agreement.

Clause 12:

The Engineer–in–charge shall have power to make any alterations, omissions or additions to or substitutions for the original specifications, drawings, designs and instructions, that may appear to him to be necessary during the progress of the work and the contractor shall carry out the work in accordance with any instructions which may be given to him in writing signed by the Engineer–in-charge and such alterations, omission, additions or substitutions shall not invalidate the contract and any altered, additional or substituted work, which the contractor may be directed to do in the manner above specified as part of the work, shall be carried out by the contractor on the same conditions in all respects on which he agreed to do the main work. The time for the completion of the work shall be extended in the proportion that the altered, additional or substituted work bears to the original contract work, and the certificate of the Engineer-in-charge shall be conclusive as to such proportion. The rates for such additional, altered or substituted work under this clause shall be worked out in accordance with the following provisions in their respective order:

(i) If the rates for the additional, altered or substituted work are specified in the contract for the work, the contractor is bound to carry out the additional, altered or substituted work at the same rates as are specified in the contract for the work.

(ii) If the rates for the additional, altered or substituted work are not specifically provided in the contract for the work, the such rates will be derived from the rates for a similar class of work as are specified in the contract for the work.

(iii) If the rates for the altered, additional or substituted work can not be determined in the manner specified in the sub-clauses (i) to (ii) above, then the rates for such composite work item shall be worked out on the basis of the concerned Schedule of Rates of the District/area specified above minus/plus the percentage which the total tendered amount bears to the estimated cost of the entire work put to tender. Provided always that if the rate for a particular part or parts of the item is not in the Schedule of Rates, the rate for such part or parts will be determined by the Engineer-in-Charge on the basis of the prevailing market rates when the work was done.

(iv) If the rates for the altered, additional or substituted work item can not be determined in the manner specified in sub-clauses (i) to (iii) above, then the contractor shall within 7 days of the date of receipt of order to carry out the work, inform the Engineer- in – Charge of the rate which it is his intention to charge for such class of work supported by analysis of the rate or rates claimed and the Engineer-in-Charge shall determine the rate or rates on the basis of prevailing market rates, and pay the contractor accordingly. However, the Engineer-in-Charge, by notice in writing, will be at liberty to cancel his order to carry out such class of work and arrange to carry it out in such manner, as he may consider advisable. But under no circumstances, the contractor shall suspend the work on the plea of non-settlement of rates on items falling under the clause.

(v) Except in case of items relating to foundations, provisions contained in sub-clauses(i) to (iv) above shall not apply to contract or substituted items as individually exceed the percentage set out in the tender documents under clause12.A.

For the purpose of operation of clause 12 (v) the following works shall be treated as work relating to foundations :-

(a) For buildings, compound wall plinth level or 1.2 meters (4 ft.) above ground level whichever is lower, excluding items above flooring and D.P.C. but including base concrete below the floors.

(b) For abutments, piers, retaining wall of culverts and bridges, walls of water reservoir and the bed of floor level.

(c) For retaining walls, where floor levels is not determinate 1.2 metres above the average ground level or bed level.

(d) For roads, all items of excavation and filling including treatment of sub base and soling work.

(e) For water supply lines, sewer lines under ground storm water drains and similar work, all items of work below ground level except items of pipe work for proper masonry work.

(f) For open storm water drains, all items of work except lining of drains.

(g) Any other items of similar nature which Engineer-in-Charge may decide relating to foundation.

The rate of any such work, except the items relating to foundations, which is in excess of the deviation limit shall be determined in accordance with the provisions contained in Clause 12A.

Clause 12A:

The quantum of additional work for each item shall not exceed 50% of the original quantity given in the agreement and the total value of additional work shall not exceed 20% of the total contract value, unless otherwise mutually agreed by the Engineer-in-charge and the Contractor. This limit shall not be applicable on items relating to foundation work which shall be executed as per original rates or provision of clause 12 (i) to (iv).

In case of contract substituted items or additional items, which results in exceeding the deviation limit laid down in this clause except items relating to foundation work, which the contractor is required to do under clause 12 above, the contractor shall within 7 days from the receipt of order, claim revision of the rate supported by proper analysis in respect of such items for quantities in excess of the deviation limit notwithstanding the fact that the rates for such items exist in the tender for the main work or can be derived in accordance with the provision of sub clause (ii) of clause 12 and the Engineer-in-Charge, may revise their rates having regard to the prevailing market rates and the contractor shall be paid in accordance with the rates so fixed. The Engineer-in-Charge shall, however, be at liberty to cancel his order to carry out such increased quantities of work by giving notice in writing to the contractor and arrange to carry it out in such manner as he may consider advisable. But under no circumstances, the contractor shall suspend the work on the plea of non-settlement of rates of items failing under this Clause.

All the provisions of the preceding paragraph shall equally apply to the decrease in rates of items for quantities in excess of the deviation limit notwithstanding the fact that the rates for such items exist in the tender for the main work or can be derived in accordance with the provisions of sub-clause(ii) of the preceding clause 12 and the Engineer-in-Charge may revise such rates having regard to the prevailing market rates unless otherwise mutually agreed by the Engineer-in-Charge and the Contractor..

Clause 13: No compensation for alteration in or restriction of work to be carried out.

If, at any time after the commencement of the work the Government shall, for any reason, whatsoever, not require the whole work, thereof, as specified in the tender, to be carried out, the Engineer-in-charge shall give notice, in writing, of the fact to the Contractor, who shall have no claim to any payments or compensation, whatsoever, on account of any profit or advantage, which he might have derived from the execution of the work in full but which he did not derive in consequence of the full amount of the work not having been carried out. Neither, shall he have any claim for compensation by reason of alterations having been made in the original specifications, drawings, and design, and instructions, which shall involve any curtailment of the work, as originally contemplated. Provided, that the Contractor shall be paid the charges for the cartage only, of materials actually brought to the site of the work by him for bonafide use and rendered surplus as a result of the abandonment or curtailment of the work or any portion thereof, and taken them back by the Contractor, provided however, that the Engineer-in-charge shall have, in all such cases, the option of taking over all or any such materials at their purchase price or at local market rates whichever may be less. In the case of such stores, having been issued from Government Stores, charges recovered, including storage charges, shall be refunded after taking into consideration any deduction for claim on account of any deterioration or damage while in the custody of the contractor, and in this respect the decision of the Engineer-in-charge shall be final.

Clause 14: Action and compensation payable in case of bad work

If, it shall appear to the Chief Engineer or any authorised authority or the Engineer-in-charge or his subordinates in-charge of the work, or to the committee of the retired officers/officers appointed by the State Government for the purpose that any work has been executed with unsound, imperfect or unskillful workmanship, or with material of any inferior description, or that any materials or articles provided by him for the execution of the work are unsound or of a quality inferior to that contracted, or otherwise not in accordance with contract, the Contractor shall on demand in writing from the Engineer-in-charge, specifying the work/materials or articles complained of, notwithstanding that the same may have been inadvertently passed, certified and paid for, will rectify or remove and reconstruct the work, so specified, in whole or in part, as the case may be, remove the materials or articles, so specified, and provide other proper and suitable materials or articles at his

own cost, and in the event of his failing to do so, within a period to be specified by the Engineer-in- Charge in his demand as aforesaid, then the Contractor shall be liable to pay compensation at the rate of one percent, on the tendered amount of work for every week not exceeding ten percent, while his failure to do so shall continue, and in the case of any such failure, the Engineer-in-Charge may rectify or remove and re-execute the work or remove and replace with others, the materials or articles complained of as the case may be, at the risk and expense, in all respects of the contractor.

Clause 15: Work to be open to inspection: Contractor or his responsible Agent to be present

All work, under or in course of execution or executed in pursuance of the contract shall, at all times, be opened to inspection and supervision of the Engineer-in-charge and his superior officers e.g. Superintending Engineer, Additional Chief Engineer, Chief Technical Engineer, Chief Engineer, and his subordinates and any other authorised agency of the Government and the contractor shall, at all times during the usual working hours, and at all other times at which reasonable notice of the intention of the Engineer-in-charge or his subordinate and any other authorised agency of Government or committee of retired officers/officers appointed by the State Government for the purpose to visit the works shall have been given to the Contractor, either himself be present to receive orders and instructions or have a responsible agent duly accredited in writing, present for the purpose. Orders given to the Contractor's agent shall be considered to have the same force as if they had been given to the Contractor himself.

Clause 16: Notice to be given before any work is covered up

The Contractor shall give not less than 7 days notice, in writing, to the Engineer-in-charge or his subordinate-in-Charge of the work, before covering up or otherwise placing beyond the reach of measurement, any work in order that the same may be measured, and correct dimensions there of, be taken before the same is so covered up or placed beyond the reach of measurement and shall not cover up or place beyond the reach of measurement any work without the consent in writing of the Engineer-in- Charge of the work, and if, any work shall be covered up or placed beyond the reach of measurement without such notice having been given or consent obtained, the same shall be uncovered at the Contractor's expense or in default, there of, no payment or allowance shall be made for such work, or for the materials with which the same was executed.

Clause 17: Contractor liable for damage done and for imperfections

If the Contractor or his work people or servants shall break, deface, injure or destroy any part of a building, in which they may be working or any building, road, fence, enclosure, or cultivated ground contiguous to the premises on which the work or any part of it is being executed, or if any damage shall happen to the work, while in progress, from any cause, whatsoever, or any imperfections become apparent in it, within a period specified in clause 37, after a certificate, final or otherwise of its completion, shall have been given by the Engineer-in-charge, may cause the same to be made good by other workmen and deduct the expense (of which the certificate of the Engineer-in-charge shall be final) from any sums that may be then, or at any time thereafter, may become due to the Contractor, or from his security deposit, or the proceeds of sale thereof, or of a sufficient portion thereof.

Clause 18: Contractor to supply plant, ladders, scaffolding etc.

The Contractor shall arrange and supply, at his own cost, all material (except such special materials, if any, as may, in accordance with the contract, be supplied from the Engineer-in-charge's stores), plants, tools, appliances, implements, ladders, cordage, tackle, scaffolding and temporary works requisite or proper for the proper execution of the work, whether original, altered, or substituted, and whether included in the specification or other documents, forming part of the Contract, or referred to in these conditions, or not, or which may be necessary for the purpose of satisfying or complying with the requirements of the Engineer in- Charge, as to any matter as to which, under these conditions, he is entitled to be satisfied or which he is entitled to require, together with carriage thereof, to and from the work. The Contractor shall also arrange and supply, without charge, the requisite number of persons with the means and materials, necessary for the purpose of setting out work and counting, weighting and assisting in the measurement or examination at any time and from time to time of the work, or materials. Failing his so doing, the same may be provided by the Engineer-in-charge, at the expense of the Contractor, and the expenses may be deducted from any money due to the Contractor under

the Contract, or from his Security Deposit or the proceeds of sale thereof, or a sufficient portion thereof. The Contractor shall also provide all necessary fencing and lights required to protect the public from accident and shall be bound to bear the expenses of defence of every suit, action or other proceeding at law, that may be brought by any person for injury sustained owing to neglect of the above precautions, and to pay any damages and costs which may be awarded in any such suit, action proceeding to any such person or which may, with the consent of the Contractor, be paid to compromise any claim by any such person.

Clause 19: Work not to be sub-let, Contract may be rescinded and Security Deposit and Performance Forfeited for sub-letting, bribing or if Contractor becomes insolvent.

The Contractor shall not be assigned or sublet without the written approval of the Chief Engineer, and if the contractor shall assign or sublet his contract or attempt so to do, or become insolvent, or commence any insolvency proceedings or mark any composition with his creditors, or attempt so to do, or if any bribe, gratuity, gift, loan, requisite reward or advantage, pecuniary or otherwise, shall either directly or indirectly, be given, promised or offered by the Contractor or any of his servants or agents to any public officer or person, in the employ of Government, in any way, relating to his office or employment, or if, any such officer or person shall become, in any way, directly or indirectly, interested in the contract, the Chief Engineer may, thereupon, by notice, in writing, rescind the contract and Security Deposit of the Contractor shall, thereupon, stand forfeited and be absolutely at the disposal of Government and the same consequences shall ensure as, if the contract had been rescinded under Clause 3 hereof, and in addition the Contractor shall not be entitled to recover or be paid for any work therefor, actually performed under the Contract.

Clause 20: Sums payable by way of compensation to be considered as reasonable compensation without reference to actual loss

All sums payable by way of compensation under any of these conditions shall be considered as reasonable compensation to be applied to the use of Government without reference to the actual loss or damage sustained and whether or not any damage shall have been sustained.

Clause 21: Changes in constitution of firm

Where the Contractor is a partnership firm, the previous approval, in writing, of the Engineer-in-charge shall be obtained before any change is made in the constitution of the firm. Where the Contractor is an individual or a Hindu undivided family business concern, such approval, as aforesaid, shall likewise be obtained before the Contractor enters into any partnership agreement thereunder the partnership firm would have the right to carry out the work thereby undertaken by the Contractor. If, previous approval, as aforesaid, is not obtained, the Contract shall be deemed to have been assigned in contravention of Clause 19 hereof, and the same action may be taken, and the same consequences shall ensure, as provided in the said clause 19.

Clause 22: Work to be under direction of Engineer-in-charge

All the works, to be executed under the contract, shall be executed under the direction and subject to the approval, in all respect, of the Engineer-in-charge of the Government of Rajasthan for the time being, who shall be entitled to direct, at what point or points, and in what manner, they are to be commenced, and from time to time, carried on.

Clause 23: Standing Committee for Settlement of Disputes

If any question, difference or objection, whatsoever shall arise in any way, in connection with or arising out of this instrument, or the meaning of operation of any part thereof, or the rights, duties or liabilities of either party then, save in so far, as the decision of any such matter, as herein before provided for, and been so decided, every such matter constituting a total claim of Rs. 50,000/- or above, whether its decision has been otherwise provided for and whether it has been finally decided accordingly, or whether the Contract should be terminated or has been rightly terminated, and as regards the rights or obligations of the parties, as the result of such termination, shall be referred for decision to the empowered Standing Committee, which would consist of the followings:-

(i) Administrative Secretary concerned.

(ii) Finance Secretary or his nominee, not below the rank of Deputy Secretary.

(iii) Law Secretary or his nominee, not below the rank of Joint Legal Remembrancer.

(iv) Chief Engineer-cum-Addl. Secretary of the concerned department.

(v) Chief Engineer concerned (Member-Secretary).

The Engineer-in-charge, on receipt of application along with non-refundable prescribed fee, (the fee would be two percent of the amount in dispute, not exceeding Rs. one Lac) from the Contractor, shall refer the disputes to the committee, within a period of three months from the date of receipt of application.

Procedure and Application for referring cases for settlement by the Standing Committee shall be, as given in Form RPWA 90.

Clause 23A: Contractor to indemnify for infringement of Patent or design

Contractor shall fully indemnify the Governor of Rajasthan against any action, claim or proceeding, relating to infringement or use of any patent or design, or any alleged patent or design, rights, and shall pay any royalties, which may be payable in respect of any article or part thereof, included in the contract, in the event of any claims made under or action brought against Government. In respect of any such matters, as aforesaid, the Contractor shall be, immediately, noticed thereof, and the Contractor shall be at liberty, at his own expense, to settle any dispute or to conduct any litigation, that may arise therefrom provided that the Contractor shall not be liable to indemnify the Governor of Rajasthan, if the infringement of the patent or design or any alleged patent or design, right is the direct result of an order passed by the Engineer-in-Charge in this behalf.

Clause 24: Imported Store articles to be obtained from Governemnt

The contractor shall obtain from the stores of the Engineer-in-charge, all imported store articles which may be required for the work or any part thereof, or in making up articles required thereof, or in connection therewith, unless he has obtained permission, in writing, from the Engineer-in-charge, to obtain such stores and articles from else-where. The value of such stores and articles, as may be supplied to the Contractor by the Engineer-in-charge, will be debited to the Contractor, in his account, at the rates shown in the schedule attached to the contract, and if they are not entered in the schedule, they will be debited at cost price, which for the purposes of this contract, shall include the cost of carriage and all other expenses, whatsoever, which shall have been incurred in obtaining delivery of the same at the stores aforesaid plus storage charges.

Clause 25: Lump-sums in estimates

When the estimate, on which a tender is made includes lump sums, in respect of parts of the work, the Contractor shall be entitled to payment in respect of the item of work involved, or the part of the work in question at the same rates, as are payable under the contract for such items or if the part of the work in question is not, in the opinion of the Engineer-in-charge, capable of measurement, the Engineer-in-charge may at his discretion pay the lump sum amount entered in the estimate and the certificate in writing of the Engineer-in-charge shall be final and conclusive with regard to any sum or sums payable to him under the provisions of this clause.

Clause 26: Action where no Specification

In case of any Class of work for which there is no such specification as is mentioned in the contract document referred in ITB Clause 4.1, such work shall be carried out in accordance with the detailed specification of the department and also in accordance with the instructions and requirement of the Engineer-in-charge.

Clause 27: Definition of work

The expression “works” or “work” where used in these conditions, shall, unless there be some thing either in subject or context, repugnant to such construction, be construed and taken to mean the works by or by virtue of the contract contracted to be executed, whether temporary or permanent, and whether original, altered, substituted or additional.

Clause 27A: Definition of Engineer-in-charge

The term "Engineer-in-charge" means the Divisional officer who shall supervise and be incharge of the work and who shall sign the contract on behalf of the Governor.

Clause 28:

It can not be guaranteed that the work will be started immediately after the tenders have been received. No claims for increase of rate will be entertained, if the orders for starting work are delayed.

Clause 29: Payments at reduced rates on account of items of work not accepted and not completed to be at the discretion of the Engineer-in-charge

The rates for several items of works, estimated to cost more than Rs. 1,000/-, agreed within, will be valid only when the item concerned is accepted as having been completed fully in accordance with the sanctioned specifications. In cases, where the items of work are not accepted, as so completed, the Engineer-in-charge may make payment on account of such items, at such reduced rates, as he may considers reasonable, in the preparation of final or on account bills, and his decision in the matter shall be final and binding.

Clause 29A: Payments at part rates

The rates for several items of works may be paid at part rates provisionally in running bills in proportion to the quantum of items executed at the discretion of Engineer-in-charge. In case of item rates, if the rate quoted for certain items are very high in comparison to the average/overall tendered premium, then the payment at running stages shall not be made more than the average sanctioned premium. The deferred payment, will however be released after successful completion of the work.

Clause 30: Contractor's percentage whether applied to net or gross amount of bills

The percentage referred to at page 2 of the tender will be deducted /added from/to the gross amount of the Bills before deducting the value of any stock issued.

Clause 31: Contractor to adhere to labour laws/regulation

The Contractor shall adhere to the requirements of the Workmen's Compensation Act and Labour Legislation in force from time to time and be responsible for and shall pay any compensation to his workmen which would be payable for injuries under the Workmen's Compensation Act, here-in-after called the said Act. If such compensation is paid by the State as Principal employer under Sub Section (1) of section 12 of the said Act, on behalf of the Contractor, it shall be recoverable by the State from the Contractor under Sub Section (2) of the said section. Such compensation shall be recovered in the manner laid down in clause 1 of the Conditions of Contract.

Clause 32: Withdrawal of work from the Contractor

If the Engineer-in-charge shall at any time and for any reasons, whatever, including inability to maintain prorate progress, think any portion of the work should not be executed or should be withdrawn from the Contractor, he may, by notice in writing to that effect, require the Contractor not to execute the portion of the work specified in the notice, or may withdraw from the Contractor the portion of work, so specified, and the Contractor shall not be entitled to any compensation, by reason of such portion of work having been withdrawn from him. The Engineer-in-charge may supplement the work by engaging another agency to execute such portion of the work at the cost of the original contractor, without prejudice to his rights under clause 2. He shall also be competent to levy compensation for delay in progress. The recovery of excess cost shall be made from next available running bill or any other claim and shall not be deferred.

Clause 33:

The Contract includes clearance, leveling and dressing of the site within a distance of 15 meters of the building on all sides except where the building adjoins another building.

Clause 34: Protect works

The Contractor shall arrange to protect, at his own cost, in an adequate manner, all cut stone work and other work, requiring protection and to maintain such protection, as long as work is in progress. He shall remove and replace this protection, as required by the Engineer-in-Charge, from time to time. Any damage to the work, so protected, no matter how it may be caused, shall be made good by the Contractor free of cost.

All templates, forms, moulds, centering, false works and models, which in the opinion of the Engineer-in-Charge, are necessary for the proper and workman like execution of the work, shall be provided by the Contractor free of cost.

Clause 35: Contractor liable for settlement of claims caused by his delays

If the progress of the work has fallen so much in arrears as to prevent other contractors on the work, from carrying out their part of the work within the stipulated time, he will be liable for the settlement of any claim, put in by any of these contractors for the expenses of keeping their labour unemployed, to the extent considered reasonable by the Engineer-in-Charge.

Clause 36A:

The liability, if any, on account of quarry fees, royalties, Octroi and any other taxes and duties in respect of materials actually consumed on public work, shall be borne by the Contractor.

Clause 36B:

The cost of all water connections, necessary for the execution of work, and the cost of water consumed and hire charges of meters and the cost of electricity consumed in connection with the execution of work, shall be paid by the Contractor, except where otherwise specifically indicated.

Clause 36C: Payment of Sales Tax, and any other Taxes

Royalty or other tax on materials, issued in the process of fulfilling contract, payable to the Government under rules in force, will be paid by the Contractor himself.

Clause 36D:

In respect of goods and materials procured by the Contractor, for use in works under the contract, sales tax will be paid by the Contractor himself. But in respect of all such goods manufactured and supplied by the Contractor and works executed under the contract, the responsibility of payment of sales tax would be that of the Engineer-in-charge.

Clause 37: Refund of Security Deposit

The Security Deposit will be refunded after the expiry of the period, as prescribed below: -

(a) In case of contracts relating to hiring of trucks and other T&P, transportation including loading, unloading of materials, the amount of **Security Deposit** is refundable along with the final bill.

(b) **Supplies of material**: As per provisions of G.F.& A.R.

(c) **Ordinary repairs**: 3 months after completion of the work provided the final bill has been paid.

(d) **Original works/special repairs/renewal works**: Six months after completion except in case of works, such as building works, bridge works, cross drainage works, Dams, Canals, water supply and sewerage schemes (except where provided otherwise in any specified case) etc., the Security Deposit will be refunded 6 months after completion, or expiry of one full rainy season or after expiry of defect liability period, whichever is later, provided the final bill has been paid.

Clause 38: Fair Wage Clause

(a) The Contractor shall pay not less than fair wages/minimum wages to laboures engaged by him on the work as revised from time to time by the Government, but the Government shall not be liable to pay any thing extra for it except as stipulated in price escalation clause (clause 45) of the agreement.

Explanation: "Fair Wage" means minimum wages for time or piece work, fixed or revised, by the State Government under Minimum Wages Act, 1948.

(b) The Contractor shall, notwithstanding the provisions of any contract to the contrary, cause to be paid fair wages to labourers indirectly engaged on the work, including any labour engaged by his sub-contractors in connection with the said work as if the labourers have been immediately or directly employed by him.

(c) In respect of all labourers immediately or directly employed on the work, for the purpose of the Contractor's part of this agreement, the Contractor shall comply with or cause to be complied with the Public Works Department Contract's Labour Regulations made, or that may be made by the Government, from time to time, in regard to payment of wages, wages period, deductions from wages, recovery of wages not paid, and unauthorized deductions, maintenance of wages register, wage card, publication or scale of wages and other terms of employment, inspection and submission of periodical returns and other matters of a like nature.

(d) The Engineer-in-charge shall have right to deduct from the money due to the Contractor any sum required or estimated to be required for making good the loss suffered by a worker or workers, by reasons of non-fulfillment of the conditions of the contract, for the benefit of the worker or workers, non-payment of wages or of deductions made therefrom, which are not justified by the terms of the contract, or as a result of non-observance of the aforesaid regulations.

(e) Vis-a-Vis the Government of Rajasthan, the Contractor shall be primarily liable for all payments to be made and for the observance of the regulations aforesaid, without prejudice to his right to claim indemnity from his sub-contractors.

(f) The regulations, aforesaid, shall be deemed to be part of this contract and any breach, thereof, shall be deemed to be breach of the Contract.

Clause 39: Contractor to engage technical staff

The Contractor shall engage the technical staff, as follows, on the contract works:

(a) For works costing Rs. 100 Lac and above – One Graduate Engineer

(b) For works costing between Rs. 50 Lac to Rs. 100 Lac - One qualified diploma holder having experience of not less than 3 years.

(c) For works costing between Rs. 15 Lac and Rs. 50 Lac - One qualified diploma holder

The technical staff should be available at site, whenever required by Engineer-in-charge to take instructions.

Clause 39 A:

The Contractor shall comply with the provisions of the Apprenticeship Act, 1961, and the Rules and Orders issued, thereunder, from time to time. If he fails to do so, his failure will be a breach of contract. The Contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the said Act.

Clause 40: Safety code

The Contractor shall follow the safety code (s) of the department and as specified in special conditions of contract.

Clause 41: Near Relatives barred from tendering

The Contractor shall not be permitted to tender for works in Circle, in which his near relative is posted as Divisional Accountant or as an officer in any capacity between the grades of the Superintending Engineer and Assistant Engineer (both inclusive). He shall also intimate the names of persons, who are working with him in any capacity, or are subsequently employed by him and who are near relatives to any gazetted officer in the Organization/Department. Any breach of this condition by the Contractor would render him liable to be removed from the approved list of contractors of the Department. If such facts is noticed (a) before sanction of tender, his offer shall be declared invalid and earnest money shall be forfeited, (b) after sanction of the tender then the tender sanctioning authority may at his discretion forfeit his earnest money, security deposit and enlistment

deposit and work/remaining work may allot to any registered contractor on the same rates as per rules.

Note: By the term "near relative" is meant wife, husband, parents, and grand-parents, children and grand children, brothers and sisters, uncles and cousins and their corresponding in-laws.

Clause 42: Retired Gazetted Officers barred for 2 years

No Engineer of Gazetted rank or other Gazetted officer, employed in Engineering or Administrative duties in an Engineering Department of the Government of Rajasthan, is allowed to work as a Contractor for a period of 2 years of his retirement from Government service without the previous permission of Government of Rajasthan. This contract is liable to be cancelled, if either the Contractor or any of his employee is found, at any time, to be such a person, who had not obtained the permission of Government, as aforesaid, before submission of the tender or engagement in the contractor's service, as the case may be.

Clause 43: Quality Control

The Government shall have right to exercise proper Quality Control measures. The Contractor shall provide all assistance to conduct such tests.

Clause 43 A:

The work (whether fully constructed or not) and all materials, machines, tools and plant, scaffolding, temporary buildings and other things connected therewith, shall be at the risk of the contractor until the work has been delivered to the Engineer-in-charge, and a certificate from him, to the effect, obtained.

Clause 44: Death of Contractor

Without prejudice to any of the rights or remedies under the contractor, if the Contractor dies, the legal heirs of the Contractor or the Chief Engineer or duly authorised Engineer shall have the option of terminating the contract without any compensation.

Clause 45: Price Variation Clause

If, during the progress of the contract of value exceeding Rs. 50 lacs (accepted tendered amount minus cost of material supplied by the department), and where stipulated completion period is more than 3 months (both the conditions should be fulfilled), the price, of any materials/ diesel and petrol/cement/steel incorporated in the works (not being materials to be supplied by the department) and / or wages of labour increases or decreases, as compared to the price and / or wages prevailing at the date of opening of tender or date of negotiations for the work, the amounts payable to contractors for the work shall be adjusted for increase or decrease in the rates of materials (excepting those materials supplied by the department)/ labour/ diesel and petrol/cement/ steel. If negotiated rates have been accepted, prices as on the date of negotiation shall be considered for price adjustment. Similarly, if rates received on the date of opening of tenders have been accepted, then prices on the date of opening of tender shall be considered for price adjustment.

Increase or decrease in the cost of labour/material/diesel and petrol/cement/steel shall be calculated quarterly in accordance with the following formula:-

(A) <u>Labour</u>

$$V_L = 0.75 \times \frac{P_L}{100} \times R \times \frac{(I_{L1} - I_{L0})}{I_{L0}}$$

V_L = Increase or decrease in the cost of work during the quarter under consideration due to change in rates for labour.

R = The value of the work done in rupees during the quarter under consideration excluding the cost of materials supplied by the department and excluding other items as mentioned in this clause.

I_{L0} = The average consumer price index for industrial workers (whole sale prices) for the quarter in which tenders were opened/negotiated (as published in Reserve Bank of India Journal/Labour Bureau Simla, for the area).

I_{L1} = The average consumer price index for industrial workers (whole sale prices) for the quarter of a calendar year under consideration (as published in Reserve Bank of India Journal /Labour Bureau Simla, for the area).

P_L = Percentage of labour components.

Note: In case of revision of minimum wages by the Government or other competent authority, nothing extra would be payable except the price escalation permissible under this clause.

(B) Material (excluding material supplied by the department).

$$V_M = 0.75 \times \frac{P_M}{100} \times R \quad \frac{(L_{M1} - L_{M0})}{L_{M0}}$$

V_M = Increase or decrease in the cost during the quarter under consideration due to change in rates of material.

R = The value of the work done in rupees during the quarter under consideration excluding the cost of materials supplied by the department and excluding other items as mentioned in this clause.

L_{M0} = The average wholesale price index (all commodities) for the quarter in which tenders were opened/negotiated (as published in Reserve Bank of India Journal/Economic Adviser to Government of India, Ministry of Industries, for the area).

L_{M1} = The average wholesale price index (all commodities) for the quarter under consideration (as published in Reserve Bank of India Journal/Economic Adviser to Government of India, Ministry of Industries, for the area).

P_M = Percentage of material components (excluding materials supplied by the Department).

(C) Bitumen

$$V_b = 0.75 \times \frac{P_b}{100} \times R \quad \frac{(B_i - B_0)}{B_0}$$

V_b = Increase or decrease in the cost of work during the quarter under consideration due to change in rates for bitumen.

R = The value of the work done in rupees during the quarter under consideration excluding the cost of materials supplied by the department and excluding other items as mentioned in this Clause.

B_0 = The wholesale price for bitumen on day of opening of tenders/negotiation, as published by the Economic Advisor to Government of India, Ministry of Industry.

B_i = The average wholesale price index for bitumen for the quarter under consideration as published weekly by Economic Adviser to Govt. of India, Ministry of Industry

P_b = Percentage of bitumen component excluding bitumen supplied by the department (Specified in the sanctioned estimate of the work).

(D) Petroleum

$$V_f = 0.75 \times \frac{P_f}{100} \times R \quad \frac{(F_i - F_0)}{F_0}$$

V_f = Increase or decrease in the cost of the work during the quarter under consideration due to change in the rates for fuel and lubricants.

R = The value of the work done in rupees during the quarter under consideration excluding the cost of materials supplied by the department and excluding other items as mentioned in this clause.

F_0 = The average wholesale price Index of High speed Diesel (HSD) as published by the Economic Adviser to Govt. of India, Ministry of Industry on the day of opening of tender/negotiations.

Fi = The average wholesale price Index of H.S.D. for the quarter under consideration as published weekly by the Economic Adviser to the Government of India, Ministry of Industry.

P_f = Percentage of fuel and lubricants component excluding fuel and lubricants supplied by the departments (Specified in the sanctioned estimate for the work).

Note: For application of this clause price of HSD is chosen to indicate fuel and lubricant component.

(E) <u>Cement</u>

$$V_c = 0.75 \times \frac{P_c}{100} \times R \times \frac{(Lc1 - Lc_0)}{Lc_0}$$

V_c = Increase or decrease in the cost of work during the quarter under consideration due to change in rates of cement.

R = The value of the work done in rupees during the quarter under consideration excluding the cost of cement supplied by the department and excluding other items as mentioned in this Clause.

Lco = The average wholesale price index for the quarter in which tenders were opened/ negotiated, as published by the Economic Advisor to Government of India, Ministry of Industry.

Lc1 = The average wholesale price index for the quarter under consideration as published weekly by Economic Adviser to Govt. of India, Ministry of Industry

P_C = Percentage of cement component excluding bitumen supplied by the department .

F) <u>Steel</u>

$$V_S = 0.75 \times \frac{P_S}{100} \times R \times \frac{(Ls1 - Ls_0)}{Ls_0}$$

V_S = Increase or decrease in the cost of work during the quarter under consideration due to change in rates of steel.

R = The value of the work done in rupees during the quarter under consideration excluding the cost of steel supplied by the department and excluding other items as mentioned in this Clause.

Lso = The average wholesale price index for the quarter in which tenders were opened/ negotiated, as published by the Economic Advisor to Government of India, Ministry of Industry.

Ls1 = The average wholesale price index for the quarter under consideration as published weekly by Economic Adviser to Govt. of India, Ministry of Industry

P_s = Percentage of steel component excluding bitumen supplied by the department .

Note: For application of this clause price of HSD is chosen to indicate fuel and lubricant component.

Clause 45A: Price Variation in installation of elevators, supply/installation of Central Air Conditioning and Central Evaporating Cooling Works

In all cases of contracts for installation of elevators, supply/installation of Central Air Conditioning and Central Evaporating Cooling Works, the price quoted shall be based on the Indian Electrical and Electronics Manufacturers Association (IEEMA) price variation clause based on the cost of raw materials/ components and labour cost as on the date of quotation/ tender, and the same is deemed to be related to wholesale price index number of metal products and All India Average consumer price index number of industrial workers as specified below. In case of any variation in these index numbers, the prices shall be subject to adjustment up or down in accordance with following formula:

$$P = \frac{P_o}{100}\left(15 + 55\,\frac{MP}{MP_o} + \frac{W_o(D)}{W_o} + \frac{W_o(1)}{W_o}\right)$$

Where:

P = Price payable as adjusted in accordance with the above price variation formula.

P_o = Price quoted/confirmed

MP_o = Wholesale Price Index Number for metal products as published by the office of the Economic Adviser, Ministry of Industry, Government of India, in their weekly bulletin. Revised Index Number of Wholesale Prices (Base: 1981-82=100) for the week ending first Saturday of the relevant calendar month. The relevant month shall be that in which price was offered or negotiated whichever is later.

W_o = All India Average Consumer Price Index Number for Industrial workers (Base: 1982=100), as published by Labour Bureau, Ministry of Labour, Government of India, for relevant calendar month. The relevant month shall be that in which price was offered or negotiated whichever is later.

The above index number MP_o & W_o are those published by IEEMA as prevailing on the first working day of the calendar month FOUR months prior to the date of tendering.

MP = Wholesale Price Index Number of Number of Metal Products as published by the office of Economic Adviser, Ministry of Industry, Government of India, in their weekly bulletin, Revised index Number of wholesale prices (Base: 1981-82=100). The applicable wholesale price Index Number for Metal Products as prevailing on 1st Saturday of the month covering the date FOUR months prior to the date of delivery and would be as published by IEEMA.

$W_o(D)$ = All India Average Consumer Price Index Number for Industrial workers prevailing for the month covering the date FOUR months prior to the date of delivery of manufactured material and would be as published by IEEMA.

$W_o(1)$ = All India Average Consumer Price Index Number for Industrial workers (Base: 1982=100) as published by labour Bureau, Ministry of Labour Government of India. The applicable All India Consumer Price Index Number of Industrial workers prevailing for the FOUR months prior to the date of completion of installation/ progress parts of installation and would be as published by IEEMA. The date of delivery shall be the date on which the manufactured material is actually supplied at site. The date of completion of installation (or progress part of installation) shall be the date on which the work is notified as being completed and is available for inspection/ duly tested. In the absence of such notification, the date of completion is not intimated, such completion shall be considered by the Engineer-in-charge which shall be final.

Note 1. The Wholesale Price Index Number for Metal Products is published weekly by the office of the Economic Adviser, but if there are any changes, the same are incorporated in the issue appearing in the following week. For the purpose of this Price Variation Clause, the final index figures shall apply.

Note 2. The sole purpose above stipulation is to arrive at the entire contract under the various situations. The above stipulation does not indicate any intentions to sell materials, under this contract as movables.

Note 3. The indices MP & W_o are regularly published by IEEMA in monthly basic price circulars based on information bulletins from the authorities mentioned. These will be used for determining price variation and only IEEMA Circulars will be shown as evidence if required.

General Conditions for admissibility of Escalation

1. The exact percentage of labour/material (excluding materials to be supplied by the department)/bitumen/diesel and petrol/cement/ steel component for the work shall be approved by the authority while sanctioning the detailed Estimates.
2. *The break-up of components of labour/materials (excluding materials to be supplied by the department)/bitumen/diesel/ petrol/cement and steel as indicated in Clause 45 have been predetermined as below:*

SN		Percent
a)	Labour	30%
b)	Steel	40%
c)	Cement	3%
d)	Material (excluding other items mentioned at SN (b), (c), (d) & (e))	27%

3. While allowing price escalation the following shall be deducted from the value of work done (R):
   (a) Cost of material supplied by the Department.
   (b) Cost of services rendered as per clause 34.
   (c) Secured Advance/any advance added earlier but deducted now after work is measured.
   (d) Cost of extra items, the rates for which have been worked out based on market rates/mutually agreed rates.
4. The first statement of escalation shall be prepared at the end of three months in which the work was awarded and the work done from the date of start to the end of this period shall be taken into account. For subsequent statement, cost of work done during every quarter shall be taken into account. At the completion of work, the work done during the last quarter or fraction, thereof, shall be taken into account.
5. For the purpose of reckoning the work done during any period, the bills prepared during the period shall be considered. The dates of recording measurements in the Measurement Book by the Assistant Engineer shall be the guiding factor to decide the Bills relevant to any period. The date of completion, as finally reordered by the competent authority in the Measurement Book, shall be the criterion.
6. The index relevant to any quarter, for which such compensation is paid, shall be the arithmetical average of the indices relevant of the calendar month.
7. Price adjustment clause shall be applicable only for the work that is carried out within the stipulated time, or extension thereof, as are not attributable to the contractor.
8. If during the progress in respect of contract works stipulated to cost Rs. 50 lacs or less, the value of work actually done excluding cost of material supplied by the Department, exceeds Rs. 50 lacs and completion period is more than 3 months, then escalation would be payable only in respect of value of work in excess over Rs. 50 lacs from the date of satisfying both the conditions.
9. Where originally stipulated period is 3 months or less but actual period of execution exceeds beyond 3 months on account of reasons not attributable to contractor, escalation amount would be payable only in respect of extended period if amount of work is more than Rs. 50 lacs.
10. In case the contractor does not make prorate progress in the first or another time span and the short fall in progress is covered up by him during subsequent time span within original stipulated period then the price escalation of such work expected to be done in the previous time span shall be notionally give based upon the price index of that quarter in which such work was required to be done.
11. No claims for price adjustment other than those provided herein, shall be entertained.

12. If the period of completion including extended period attributable to Government exceeds three months but cost does not exceeds more than Rs. 50 lacs, no escalation is admissible.
13. Similarly, if cost of works increases more than Rs. 50 lacs but completion period including extended period attributable to government is less than 3 months, no escalation is admissible.
14. No provisional escalation is payable on the basis of indices of the previous quarter in absence of non publication of indices for concerned quarter by the RBI.
15. Escalation is always payable quarterly and no provisional escalation is payable monthly for fortnightly.
16. In case at the time of executing agreement, both the conditions (completion period 3 months and amount of work Rs. 50 lacs) for admissibility of price escalation are not fulfilled and subsequently due to additional work and extension of time attributable to government, both the conditions become fulfilled, in that case the escalation of time attributable to Government, both the conditions become fulfilled, in that case the escalation shall be payable from the date of satisfying both the conditions and only for work done beyond Rs. 50 lacs and in period of work beyond 3 months.
17. The contractor shall for the purpose of this conditions keep such books of account and other documents as are necessary to show the amount of any increase climbed or reduction available and shall allow inspection of the same by a duly authorized representative of Government and further shall at the request of the Engineer-in-charge furnish, verified in such a manner as the Engineer-in-Charge may require any documents so kept and such other information as the Engineer-in-Charge may require.
18. Price variation clause shall be applicable in case of lump sum contracts estimated to more than Rs. 100 crore with stipulated completion period of more than 18 months.
19. The component of operation and maintenance (O&M) cost included in the contract price shall not be subject to price variations. The price may be adjusted by the use of prescribed formula (or formulae) which breaks down the total price into components.
20. The amount of price variation in case of lump sum contracts will be made by adding or deducting, as the case may be from the payments made at the stages of work specified in the contract document.

Clause 46: Force-Majeure

Neither party shall be liable to each other, for any loss or damage, occasioned by or arising out of acts of God such as unprecedented floods, volcanic eruptions, earthquake or other invasion of nature and other acts.

Clause 47: General Discrepancies and Errors

In case of percentage rate tenders, if there is any typographical or clerical error in the rates shown by Department in the "G" Schedule, the rates as given in the Basic Schedule of Rates of the Department for the area shall be taken as correct.

Clause 48: Post payment Audit & Technical Examination

The Government shall have right to cause an audit and technical examination of the works, and the final bills of the contractor, including all supporting vouchers, abstracts, etc., to be made within 2 years after payment of the final bill, and if, as a result of such audit and technical examination, any sum is found to have been over paid in respect of any work done by the Contractor under the contract, or any work claimed by him to have been done by him under the Contract and found not to have been executed or executed below specifications, the Contractor shall be liable to refund the amount of over payment, and it shall be lawful for Department to recover the same from him in the manner prescribed in Clause 50 or in any other manner legally permissible, and if it is found that the Contractor was paid less than what was due to him under the contract in respect of any work executed by him under it, the amount of such under-payment shall be duly paid by the Government to the Contractor.

Clause 48A: Pre Check or Post Check of Bills

The Government shall have right to provide a system of pre-check of Contractor's bill by a specified Organization, and payment by an Engineer or an Accounts Officer/sr. Accounts Officer/ chief Accounts Officer/ financial Advisor, as the Government may in its absolute discretion prescribe. Any over-payments excess payments de-

tected, as a result of such pre-check or post-check of Contractor's bills, can be recovered from the Contractor's bills, in the manner, herein before provided, and the Contractor will refund such over/excess payments.

Clause 48B: Check Measurements

The department reserves to itself, the right to prescribe a scale of check measurement of work, in general, or specific scale for specific works, or by other special orders (about which the decision of the department shall be final). Checking of measurement by superior officer shall supersede measurements by the subordinate officer, and the former will become the basis of the payment. Any over/excess payments detected, as a result of such check measurement or otherwise at any stage up to the date of completion and the defect removal period specified elsewhere in this contract, shall be recoverable from the Contractor, as any other dues payable to the Government.

Clause 49: Dismantled materials

The Contractor, in course of the work, should understand that all materials e.g. stone, bricks, steel and other materials obtainable in the work by dismantling etc. will be considered as the property of the Government and will be disposed off to the best advantage of the Government, as per directions, of the Engineer-in-charge.

Clause 50: Recovery from Contractors

Whenever any claim against the Contractor for the payment of a sum of money arises out of or under the contract, the Department shall be entitled to recover such sum by appropriating, in part or whole of the Security Deposit, Security Deposit at the time of enlistment of the Contractor. In the event of the security being insufficient, or if no security has been taken, then the balance or the total sum recoverable, as the case may be, shall be deducted from any sum, then due or which at any time, thereafter, may become due to the Contractor, under this or any other contract with the Governor of Rajasthan. Should this sum be not sufficient to cover the full amount recoverable, the Contractor shall pay to the Department on demand the balance remaining dues.

The department shall, further, have the right to effect such recoveries under Public Demand Recovery Act.

Clause 51: Jurisdiction of Court

In the event of any dispute arising between the parties hereto, in respect of any of the matters comprised in this agreement, the same shall be settled by a competent Court having jurisdiction over the place, where agreement is executed and by no other court, after completion of proceedings under Clause 23 of this Contract.

Note: The standard format as given above is as per PWF&AR and the provisions of Special Conditions shall overrule the provisions of these General Conditions of Contract.

Schedule of Materials to be supplied by the Department, if available

(Referred to in clause 10)

S.No.	Particulars	Quantity, meters	Rates		Place of Delivery
			Unit	Rupees	
1.	**NIL**				
2.					
3.					

Schedule of Machinery/T&P to be supplied by the Department

The following Machinery/T&P shall be supplied by the Department, if available, to the Contractor, on hire as per "Rules of the Department for supply for machinery and T&P to the Contractor on hire"

(Referred in Clause 10 C)

S.No.	Item	Rate	Place of Delivery and Return
	NIL		

Progress Statement referred to in Clause 2 of Conditions of Contract

Name of Work	Date from which the work should be commenced	Date by which the work should be completed	Monthly rate of Progress
1	2	3	4

The contractor has been informed that his tender has been accepted

Dated Signature of Engineer- in -charge Dated signature of Contractor

Notes:- For Filling in the Progress Statement Form

1. Columns 2,3, and 4 must be initialled and dated by the Contractor
2. Column 4 must be initialled and dated by the Chief Engineer or other duly authorised Engineer also.
3. The date in column 2 should correspond to the date on which the order to commence work is given to the contractor read with Clause 2 of the conditins of contract.
4. The date in column 3 must correspond to the period stated in Sub clause(e) of the Memorandum below “Tender for works”.
5. Column 4. This will ordinarily be worked out proportionately; thus if Rs. 24,000/- is the cost of the whole or portion of work tendered for, and six months period of completion, then the monthly rate of progress should be Rs. 4,000. If necessary, quantities may also be specified in this column at the discretion of the Chief Engineer.
6. The Certificate as to intimation of acceptance of tender printed at the foot of the form, must be signed and dated both by the Chief Engineer or other duly authorised Engineer and the Contractor.

Executive Engineer
PHED District Rural Division II,
Bikaner

SAFFETY CODE

1. Suitable scaffolds should be provided for workman for all works that cannot be safely be done on the grounds or from solid construction except such short period work as can be done safely from ladders, when a ladder is used an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, suitable footholds and handholds shall be provided on the ladder and the ladder shall be given an inclination not steeper than 14/ to1 (1/14 horizontal and 1 vertical).

2. Scaffolding or staging more than 12" above the ground or floor; swung or swung or suspended from an overhead support or erected with stationary support shall have a guard rails properly attached, bolted, braced and otherwise secured at least 3 feet high above the floor platform of such scaffolding to staging and extending along the entire length of the outside the ends with only such opening as may be necessary for the deliver of the materials, such scaffolding or staging shall be fastened as to prevent it from swaying from the building or structure.

3. Working platform, Gangways and stairways should be so constructed that they should not sag unduly or unequally and if the height of the Gangway of the stairway is more than 12 feet above ground level and for floor level they should be closely boarded have adequate width and should be closely boarded, should have adequate width and should be suitably fenced, as described in (ii) above.

4. Every opening in the floor of a building or in a working platform be provided with suitable means to prevent the fall of person or materials be providing suitable fencing or railing whose minimum height shall be 5'=0'.

5. Sale means of access shall be provided to all working platform and other working places. Every ladder shall be securely fixed. No portable shall be over 30 fee in length while the width between side rails in rung ladder shall in no case be less than 11-12/2 ft for ladder up to and including 10 ft. in length for longer ladder this width shall be increase at ¼'. For each additional foot of length uniform step spacing shall not exceed 11 adequate precautions shall be so stacked or cause danger or inconvenience to any person or the public. The contractor shall also provide all necessary fencing and lights to protect the public from accident and shall be bound to bear the expenses of defense of every action or other precautions at law that may be brought by any persons for injury sustained owing to neglect of the above precaution and to pay damages and costs which may with consent of the be paid to compromise any claims by any such person

(vi) EXCAVATION AND TRENCHING

All trenches, four feet or more in depth shall at times be supplied with at least one ladder for each 100 feet length or fraction there of ladder shall be extended from bottom of the trench to at least 3'above the surface of the ground. The sides of the trenches which are 5' or more in depth shall be stopped back to give suitable slope of securely held by timber bracing so as to avoid the danger of sides to collapse. The excavated material shall not be placed within 5 feet on the trench, which ever is more cutting shall be done from top to bottom under on circumstances undermining or undercutting shall be done.

(vii) DEMOLITION

Before any demolition work is commenced and also during the process of the work.

(a) All roads and open areas adjacent to the work site shall either be closed or suitably protected.

(b) No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by the operator shall remain electrically charged.

(c) All practical steps shall be taken to prevent under danger to person employed from risk of fire or explosion or flooring, No floor, roof or other part of the building shall be so over loaded with debris or materials as to tender it unsafe.

(viii) All necessary personal safety equipments considered adequate by the engineer-In-Charge should be kept available for the use of person employed on the site and maintained in a condition suitable for immediate use and the contractor should take adequate steps to ensure proper use of equipments by

those concerned.

(a) Workers employed on mixing Asphalted material/ Cement and lime mortars shall be provided with protective cool wear and protective goggles.

(b) Those engaged in white washing and mixing or stacking of cement bags or any materials which in injurious to the eyes shall be provided with protective goggles.

(c) Those engaged in welding work shall be provided with welder's protective eye-shields.

(d) Stone breakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.

(e) When workers are employed in severs and manholes which are in use, the contractor shall ensure that the manhole covers opened and are entitled at least for an hour before the workers are allowed to get into the manholes and the manhole so opened shall be cordoned of with suitable railing and provided with warning singles or boards to prevent accident to the public.

(f) The contractor shall not employee men below th age of 18 and women on the work of painting with products containing leads in any form whenever men above the age of 18 are employed on the work of lead painting the following precaution should be taken.

1. No pain containing lead or lead product shall be used except in the form of paste or ready made paint.

2. Suitable face marks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scraped.

3. Overalls shall be supplied by the contractor to the workmen and adequate facilities shall be provided to enable the working painters to wash during and rescission of work.

(ix) When the work is done near any place where there is risk of drawing, all necessary equipments should be provided and kept ready for use all necessary steps taken for prompt rescue of any person to danger and adequate provision should be make for prompt. First-Aid treatment of all injuries is to be sustained during the course of work.

(x) Use of Housing Machines and tackle including their attachment anchorage and supports shall confirm to use the following standard or conditions.

1. (a) These shall be of good mechanical construction, sound material and adequate strength and free from patent defect and shall be kept in good repair and in good working order.

(b) Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength and from patent defects.

2. Every crane driver of hoisting appliances shall be properly qualified and no person under an age of 21 years should be in charge of hoisting machine including and scaffold which or give singles to the operator.

3. In case of every hoisting machine and or every chain ring hook take swivel and pulley block used in hoisting or lowering or as means of suspensions the safe working load shall be ascertained by adequate means. Every existing machine and all gear referred to above shall be plainly marked with the sage working load. In chase of a hoisting machine having a variable safe working lead each safe working load of the conditions under which it is applicable shall be clearly indicated. No part of any

machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

4. In case of departmental machine the safe working load shall be notified by the Electrical Engineer-In-Charge. As regards contractor's machines the contractor shall notify the safe working load of the machine to the Engineer-In-Charge whenever he brings any machinery to site of work and get it verified by the electrical Engineer concerned.

(xi) Motors, Granging transmission, electric wiring and other dangerous parts of holding appliances should be provided with efficient safeguards, hoisting appliances should be provided with such means will reduce to the minimum the risk of accidental devices of the load adequate precautions should be taken to minimum the risk of any part of a suspended load becoming accidental when workers employed in insulating mats wearing apparel such as gloves Sleeves and boots as may be necessary should be provided. The workers should not wear any rings, watches and every key or other material which are good conductors of electricity.

(xii) All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in sage condition and on scaffold or equipment shall be altered or removed while it is in use, adequate washing facilities shall be or near places of works.

(xiii) The safety provision should be brought to the notice of all concerned on a Notice board at prominent place at the work spot. The persons responsible for compliance of the Safety Code shall be named therein by the contractor.

(xiv) To ensure effective enforcement of the rules and regulations relation to safety precautions the arrangement made by the contractor shall be open to inspection by the Labour Officer, Engineer-In-Charge of the department of their representative.

(xv) Not withstanding the above clause from (i) to (xiv) there is nothing in these to exempt the contractor, to exclude the operations of any other Act or rule in Force Republic of India.

GOVERNMENT OF RAJASTHAN

Order for Contractor's Labour Regulation

Subject : The Rajasthan Public Works Department Contractor's Labour Regulations.

In exercise of powers under sub-clause© of clause 38 of appendix xI of the Public Works Financial & account (Second Edition) the Governor is pleased to make to the following regulation and he is further pleased to order that these Regulations shall be added as annexure to the said appendix. XI.

The Rajasthan Public Works Department Contractor's Labour Regulations:

1. Short title: - These regulations may be called "**The Rajasthan Public Works Department Contractor's Labour Regulations**".

2. Definition: - In these regulations unless otherwise expressed or indicated the following works expressions shall have the meaning here by assigned to them respectively that is to say.

   (i) "Labour" mean workers employed by a Rajasthan P.W. Department Contractor directly of indirectly through a sub contractor other or person by an agent on his behalf.

   (ii) "Fair Wage" means minimum wages for time or piece works fixed or revised by the State Government under the Minimum Wages Act. 1984.

   (iii) "Contractor" shall include every person whether a sub-contractor or Head man Agent Employing labour on the work taken on contract.

   (iv) "Wages" shall have the same Meaning defined in the payment of wages act and includes time and piece rate wages.

3. Display of notice regarding wages etc :- The contractor shall (a) Before be commences his work on contract display and correctly maintain and continue to display and copious places on the work notices in English and correctly maintain in Hindi by the majority or the workers giving the rate of wages which have been certified by the Executive Engineer, the Superintending Engineer, the Chief engineer or Labour commissioner, as fair wages and the hours of works for which such wages earned and (b) send a copy of such notices to the certifying officers.

4. Payment of wages : (i) Wages due to every worker shall be paid to his direct

   (ii) All wages shall be paid in current coin or currency or in both.

5. Fixation of wages periods :-

   (1) The contractor shall fix the wage periods in respect of which few wages shall be payable.

   (2) No wage period shall exceed one month.

   (3) Wages of every workman employed on the contract shall be paid before the expiry of ten days after the day of wage period of which the wages are payable.

   (4) When the employment of any worker is terminated by or on behalf of the contractor, the wages earned by him shall be paid before the expiry of the succeeding the one of which his employment is terminated.

   (5) All payments the wages shall be made on a working day except when the work is completed before date of expiry of the wage period in which cash final payment shall be made within 48 hours of the last working days.

NOTE: - The term working day means a day on which the labour is in progress.

(6) Wage book and wage slip etc.

(1) The contractor shall maintain a wage book of each worker in such form as may be convenient but the same shall include the following particulars:-

(a) Rate of daily or monthly wages.

(b) Nature of work on which employed.
(c) Total number of days worked during each wage period.
(d) Total amount payable for the work during each wage period.
(e) All deduction made from the wage with an indication in each case of ground for which the deduction is made.
(1) Wages actually paid for each wage period.
(2) The contractor shall also maintain wage slip for each worker employed on the work.
(3) The Executive Engineer may grant exemption from the maintenance of the wage book and wage slip to a contractor who is its opinion may not directly or indirectly employ more than 50 persons on the work.

7. Fines and deductions which may be made from wage:-

(1) The wage of a worker shall be paid to without any deduction of any kind except those authorized namely the following:-

(a) Fines.

(b) Deductions for absence from duty i.e. from the place where by the terms of his employment he is required to work. The amount of deduction shall be in proportion to the period for which he was absent.

(c) Deductions for damages to or loss of goods expressly entrusted to the employed person for custody or for loss or any other deduction or money which he required to account where such damage or losses are directly attributable to his neglect or default.

(1-A) The Rajasthan Government may from time to time allow deductions other than those specified in clause 1 above.

(2) No fines shall be imposed on working and on deduction for damage or loss shall be made until worker has been given an opportunity of showing cause against each fine or deduction.

(3) The total amount of fines which may be imposed in any one wage period on a worker shall not exceed an amount equal to three paisa in rupee of the wage payable to him in respect of that wage period.

(4) No fines imposed on any workers shall be recovered from by installments or after the expiry of 60 days from the date on which it was imposed.

8. Register on fines etc.:- The Contractor shall maintain a register of fines and deductions for damage of loss. Such register shall mention the reason for which fines were imposed or deduction for damage loss was made.

The Contractor shall maintain both English and Local India Languages list approved by the Labour commission clearly stating the acts and commission for which penalty of fine may be imposed on a workman and display it in a good condition in a conspicuous place on the work.

9. Preservation of Register: - The wage register, the wage card and the register of fines deduction required to maintain under these regulations shall be preserved for 12 months after the date to the last entry made in them.

10. Powers labour Welfare officers or made investigation of enquiry: - The labour welfare officer or any other person authorized by the State Government on their behalf shall have power to make enquiries with a view to ascertaining and enforcing due and proper observation of the fair wage

clause and provisions of the regulation. He shall investigate into any complaint regarding default made by the contractor or contractor in regard to such provisions.

11. Report of Labour welfare Officer :- The Labour Welfare Officer or other authorized shall submit a report of the result of his investigation of enquiry to the Executive Engineer concerned indicating the event if any to which the default has been committed with a note that necessary deductions from the contractors bill be made and the wage and other dues be paid to the labour concerned in case an appeal is made by contractor under clause 12 of those regulations will be made by the Executive Engineer after the Labour Commissioner has given decision on appeal.

12. Appeal against the decision of Labour Welfare Officer: - Any persons aggrieved by the decision and recommendation of the Labour Welfare Officer or other persons so authorized may appeal against such decision to Labour commissioner within 30 days from the date of decision forwarding simultaneously a copy of his appeal to Executive Engineer concerned but subject to such appeal the decision of the officer shall be final and binding upon the contractor.

13. Inspection of the wage books and slips :- The contractor shall allow inspection of the wage books and wage slip and register of fines and deduction to any of his agent at a convenient time and place after due notice is received or to the Labour Welfare Officer or any other person authorized by the State Government on his behalf.

14. Submission of returns :- The contractor shall submit periodical returns as may be specified from time to time:-

15. Amendments :- The State Government may from time add to or amend these regulations and on the decision to the application interpretation or effect of these regulations the decision to the Labour Commissioner to the Government of Rajasthan or any other person authorized by the State Government in the behalf be final.

Executive Engineer
PHED District Rural Division II
Bikaner

TENDERER

Special Conditions of Contract

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SPECIAL CONDITIONS OF CONTRACT –PART "A"

DEFINITIONS

"Department" means the Public Health Engineering Department of the Government of Rajasthan. It is the Executing Agency of the Project.

"Executive Engineer " means Executive Engineer, PHED District Rural Division II, Bikaner, Rajasthan.

"Engineer-incharge " means Executive Engineer, PHED District Rural Division II, Bikaner, Rajasthan.

"Materials" means things of all kinds (other than equipment) intended to form or forming part of the permanent works, including the supply of materials to be supplied by the contractor under the contract.

"Equipment" means the apparatus, machinery, articles and things of all kinds to be provided under the contract or intended to form or forming part of the permanent works.

"Contractor's Documents" means the calculations, computer programs and other software, drawings, manuals, models and other documents of the technical nature supplied by the contractor under the contract; as described in sub clause 8.2 [Contractors Documents].

"Specifications" means the specifications according to which the works are to be executed as referred to in the agreement documents and any other specifications agreed thereon.

"Contract price" means the sum quoted in the tender subject to such additions thereto or deduction there from as may be made under the provisions contained in the contract or as due to change in scope of work for pipeline &b reservoirs as defined in Volume IV of tender Document.

1. COMMUNICATION BETWEEN THE PHED AND THE CONTRACTOR

Addresses for notices

Notices with legal, contractual and technical issues shall be addressed to the **"**Executive Engineer, PHED District Rural Division II, Bikaner **"** or any changed address". Notices shall be addressed to the respective Engineer(s) in Charge and copy to Additional Chief Engineer, PHED, Region Bikaner and Superintending Engineer, PHED Circle Bikaner.

Any notice given by the Contractor to the Executive Engineer or the Engineer in Charge under the terms of the Contract shall be sent by post, courier, cable, telex, or fax to or left at the office of the concerned Engineer or the Engineer in Charge only at the addresses as shall be indicated for this purpose only.

All certificates, notices or instructions to be given to the Contractor by the Executive Engineer or the Engineer in Charge under the terms of the Contract shall be sent by post, courier, cable, telex, or fax to or left at the Contractor's principal address or the addresses as the Contractor shall indicate for this purpose only..

2. CONTRACT

2.1 Type of Contract

The works described in these tender documents are considered to be a turn-key job. The contractor shall execute work as described in this tender document.

2.2 Priority of contract

The documents forming part of the agreement are to be taken as mutually explanatory documents of one another. In case of discrepancies they shall be explained and adjusted by the Engineer in Charge. The priority of the Contract documents shall be as follows:

(i) Letter of award
(ii) Special Conditions of Contract
(iii) Instructions to Bidders
(iv) General Conditions of Contract

(v) Scope of Work and Technical specifications

(vi) Drawings

(vii) Schedule of prices

3. AUTHORITIES

The project shall be implemented by the Executive Engineer, PHED District Rural Division II, Bikaner. He shall appoint Engineer(s) in Charge as representatives who shall carry out such duties or any authority as directed by the Government.

Executive Engineer may also authorize consultants or institutions as Assistants. Such Assistants shall have no authority to issue any instructions to the Contractor in so far as they are necessary and to secure their acceptance of materials, Equipments and workmanship as being in accordance with the Contract. Any instructions given by them for those purposes shall be deemed to have been given by the Engineer in Charge as the Engineer's Representative.

4. MONTHLY REPORTS AND MEETINGS

4.1 Monthly Reports

Monthly progress reports shall be prepared by the Contractor and submitted to the Department in six copies. The first report shall cover the period up to the end of the first calendar month following the commencement date. Reports shall be submitted monthly thereafter, each within 7 days after the last day of the month to which it relates.

Reporting shall continue until the contractor has completed all work, which is known to be outstanding at the completion date as stated in Clauses of these conditions.

Each Report shall include the issues desired by the Engineer in Charge which shall be any of the following:

- charts / detailed descriptions of progress, including each stage of design Contractor's Document, procurement, manufacturing, delivery to site of construction, direction, testing, commissioning and the trial operation;
- photographs showing status of manufacture and of progress on the site;
- for the manufacture of each main item of equipment and materials, the name of the manufacturer, manufacture location, percentage progress, and the actual or expected dates of:
- commencement of manufacturing;
- contractor inspections,
- tests and
- shipment and arrival at the site;
- copies of quality assurance documents, test results and certificates of materials;
- Comparisons of actual and planned progress, with the details of any events or circumstances which may jeopardize the completion in accordance with the contract, and the measures being (or to be) adopted to overcome delays.
- Any other issues deemed necessary by the Engineer in Charge

4.2 Meetings

Meetings shall be held in the office of Superintending Engineer or at other places as mutually fixed in advance, with prior notice given by Engineer in Charge. The proposed agenda for the meetings shall be exchanged at least 1 week in advance. It is required that a decision-maker of the Contractor is present at the meetings so that binding decisions can be taken about outstanding issues. Generally, the following issues shall be discussed:

- Progress of the work, difficulties
- revision of time schedule
- Payment issues

- Disputes
- Claims
- Any other issue deemed necessary by contractor or department

5. RIGHT OF ACCESS TO THE SITE DURING EXECUTION

The Department shall give the contractor right of access to all parts of the site. The site for execution of the work will be made available as soon as the work is awarded. In case, it is not possible for the Department to make the entire site available on the award of the work, the Bidder shall arrange his working program accordingly. No claim, whatsoever, for not giving the site in full on award of the work or for giving the site gradually in parts will be tenable.

However, if and to the extent that the Department's failure was caused by any error or delay by the contractor, including an error in, or delay in the submission of, any of the contractor's documents, the contractor shall not be entitled to such extension of time.

6. THE CONTRACTOR

6.1 Contractor's general obligations

The contractor shall design the civil structures, execute and complete the works in accordance with the contract, and shall remedy any defects in the works. The contractor shall conduct survey & verify the levels of the proposed system(s) and lengths of the mains. The Contractor shall review the hydraulic designs of the department before execution to satisfy himself about the soundness and the safety of the designs. Finally the contractor shall be responsible for the safety & soundness of the hydraulic system & structures built under the contract so as to provide required daily design demand(s). If required, pumping head; discharge of pumps etc. shall be revised by the contractor so as to achieve the objective of the work to deliver water.

The contractor shall also confirm the feasibility of the system proposed by the department. The confirmation of the feasibility of the system proposed by the department is necessary as the final responsibility to provide designed demand(s) shall be of contractor and if required he shall provide additional equipment / material / systems to achieve the objective of the work. Unless specified otherwise, no additional payment shall be made on the account of providing the additional equipment / material / systems, change of levels, pump head & discharge, etc., and it shall be deemed that the cost of such eventuality has been accounted for in the lump sum offer.

If desired, in considerations of the survey data; the hydraulic requirement and other field limitations, the contractor so as to achieve the objectives of the work, can propose change in alignment (minor deviations to avoid structures etc., or position of pipes above or below ground etc.), etc. No additional payments shall be made on account of use of superior quality material, on this account.

In addition to the above, the contractor is also required to confirm the availability of the material required for the contract in the time schedule given herein after, so as to complete the job within the prescribed time. No time extension shall be provided on this account. If required under such circumstances, the contract after prior approval of Department shall be allowed to use superior type of material so as to complete the job within the prescribed time. No additional payments shall be made on account of use of superior quality material, on this account.

The Contractor shall provide the equipment and Contractor's Documents specified in the contract, and all Contractor's personnel, goods, consumables and other things and services, whether of a temporarily or permanent nature, required in and for this design, execution, completion and remedying of defects including O & M period for 1 year after completion of defect liability period.

The works shall include any work, which is necessary to satisfy the Department's requirements, or is implied by the contract, and all works, which (although not mentioned in the contract) are necessary for the completion, or safe and proper operation of the works.

The Contractor shall be responsible for the adequacy, stability and the safety of all site operations, of all methods of construction and of all the works.

The Contractor shall provide all facilities including conveyance required for verification of survey data, supervision, quality control tests, tests for material, equipment and equipment(s), and/or all other facilities otherwise referred in the conditions of contract(s) and/or otherwise necessary to complete the works with due supervision of Engineer-in-charge. The testing of material, quality control tests, etc. may be got done through government recognized labs after approval of Engineer-in-charge.

The Contractor shall, whenever required by the Department, submit details of the arrangements and methods, which the contractor proposes to adopt for execution of the works. No significant alteration to the arrangements and methods shall be made without this having previously been notified to the Department.

6.2 Contractor's representative

The contractor shall appoint the Contractor's Representative and shall give them all authority necessary to act on the contractor's behalf under the contract.

Unless the Contractor's Representative is named in the Contract, the Contractor shall, prior to the Commencement Date, submit to the Department for consent the name and particulars of the person the Contractor proposes to appoint as Contractor's Representative. If consent is withheld or subsequently revoked, or if the appointed person fails to act as the Contractor's Representative, the Contractor shall similarly submit the name and particulars of another suitable person for such appointment.

The Contractor shall not, without the prior consent of the Department, revoke the appointment of the Contractor's Representative or appoint a replacement.

The Contractor's Representative shall, on behalf of the Contractor, receive instructions.

The Contractor's Representative may delegate any powers, functions and authority to any person, and may at any time revoke the delegation. Any delegation or revocation shall not to take effect until the Department has received prior notice signed by the Contractor's Representative, naming the person and specifying the powers, functions and authority being delegated or revoked.

Whenever services of contractor staff are found / noticed unsatisfactory by the department, they shall be removed / terminated by the contractor immediately as per direction of Engineer in Charge.

6.3 Setting out

The contractor shall set out the works in relation to original points, lines and levels of reference specified in the contract. The contractor shall be responsible for the correct positioning of all parts of the works, and shall rectify any error in the positions, levels, the dimensions or alignment of the works.

6.4 The safety procedures

The contractor shall:

a. comply with all applicable safety regulations and the safety code
b. take care for the safety of all person's entitled to be on the site,
c. choose reasonable efforts to keep the site and work clear of unnecessary obstruction so as to avoid danger to these persons,
d. provide fencing, lighting, guarding and watching of the works until completion and its taking over by the department at end of O & M period as defined in clause 1.4. of Special Conditions Part 'B'.
e. provide any temporary works (including road ways, foot ways, guards and fences) which may be necessary, because of the execution of works, for the use and protection of the public and of owners and occupy a server adjacent land.

6.5 Quality Assurance

In addition to the provisions of clause 43 of General conditions of contract, the contractor shall institute a quality assurance system to demonstrate compliance with requirements of the contract. The system shall be in accordance with the details stated in the contract and the Quality Assurance Program will be got approved from the competent authority. The Departments shall be entitled to audit any aspect of the system.

Details of all procedures, if adopted other than those laid down in the tender document, and compliance documents shall be submitted to the Departments for information before each design and revocation stage is commenced. When any document of a typical nature is submitted to the Department, evidence of the prior approval by the contractor himself shall be apparent on the document itself.

Compliance with the quality assurance system shall not relieve the contractor of any of his duties, obligations or responsibilities under the contract.

6.6 Site Data

Design made by the department is of preliminary in nature. However the designs made by the department, and investigations carried out by department can be seen during the execution of the contract for reference purpose.

The contractor shall be responsible for verifying and interpreting all site data. The department shall have no responsibility for accuracy, sufficiency or completeness of such data, irrespective of its use by the department while making preliminary designs.

6.7 Un-Foreseenable Difficulties

(a) The contractor shall be deemed to have obtained all necessary information as to risk, contingencies and other circumstances that may influence or affect the works;

(b) by signing the contract, the contractor accepts the total responsibility for having sustained all difficulties and costs of successfully completing the works: and

(c) the contract price shall not be adjusted to take account of any unforeseen difficulties or costs.

6.8 Rights of Way and Facilities

The Contractor shall bear all costs and charges for special and/or temporary rights of Way, which he may require, including those for access to the site. The contractor shall also obtain, at risk and costs, any additional facilities outside the site which he may require further purposes of the works.

6.9 Avoidance of Interference

The contractor shall not interfere unnecessarily or improperly with:

(a) the convenience of the public, or

(b) in the access to and use and occupation of all roads and other land, irrespective of whether they are public or in the possession of the Department or others.

The contractor shall indemnify and hold the Department harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from any such unnecessary or improper interference.

6.10 Security of the Site

Unless otherwise stated in particular conditions:

a. the contractor shall be responsible for keeping unauthorized persons off the site, offices, campus etc. within the scope of work and
b. authorised person's shall be limited to the Contractor personnel and the Department's personnel; and to any other personnel notified to the Contractor, by (or on behalf of) the Department, and

Providing adequate manpower for the security of the material brought to the site for which payment has been made to the contractor.

6.11 Contractor’s Operations On-site

The Contractor shall confine his operations to the site, and to any additional areas, which may be obtained by the Contractor and agreed by the Department as working areas. The Contractor shall take all necessary precautions to keep Contractor’s equipment and Contractor personnel within the site and these additional areas, and to keep them off adjacent land.

During the execution of the works, the Contractor shall keep the site free from all unnecessary obstruction, and shall store or dispose of any Contractor's equipment or surplus materials. The Contractor shall clear away and remove from the site any wreckage, rubbish and temporary works which are no longer required.

6.12 Land for the Work and For the Contractor's Establishment

The land or the land rights for the sites of the permanent Work will be provided by PHED, during the progress of work. However, sufficient land and site for works shall be provided to the contractor as per the agreed execution plan submitted by the contractor and approved by the department.

For the purpose of constructing Contractor's yard, godown, site office, staff quarters, etc. the contractor may utilize the land and existing buildings / structures allocated to him by PHED after obtaining requisite permission from the Engineer in Charge. All expenses in connection with purchase or construction or maintenance or removal etc. of such items shall be borne by the Contractor.

PHED may allocate the land and buildings for use by the Contractor according to its possibilities only. If the land or buildings are not available or are insufficient for the purposes of the Contractor's establishment, additional land or buildings will have to be procured/rented by the Contractor himself at his own cost and expenses as per his requirement.

Recovery of rent towards the use of building by contractor for office/store/residence provided by the department shall be done on fair rent assessment basis.

7. ORGANIZATION ON THE SITE

7.1 Contractor's office

The Contractor shall have an office(s) near the site(s), and shall during office hours on all working days have a clerk or some other authorized person always present at such office, upon whom a notice may be served. Service of any notice left with such clerk or authorized person shall be deemed good, served upon the Contractor.

The contractor shall also provide reasonable office facilities for the supervisory staff of department at the site.

7.2 Contractor's staff

The Contractor shall employ for the execution of work only such persons as are skilled and experienced in all activities required for the completion of the Works, from reconnaissance, design, manufacturing, execution and testing to commissioning. The Engineer in Charge shall be at liberty to object to and require the Contractor to remove from the Work any person who in the opinion of the Engineer in Charge misconducts himself or is incompetent or negligent in the proper performance of his duties. Such person shall not again be employed without permission of the Engineer in Charge.

The Contractor shall employ labour in sufficient number to maintain the required rate of progress and quality to ensure workmanship of the degree specified in the Contract.

The contractor shall provide at last one approved senior Hindi/English speaking Engineer to supervise the construction of the works in the contract and to act as the contractor's Representative. The contractor shall also provide sufficient erectors skilled in constructional mechanical, electrical and instrumental engineering, with such skilled, semi-skilled and unskilled labour as are necessary to ensure completion of the various sections of the contract in time required. The contractor shall not remove and supervisory staff of labour from the site without prior approval of the Engineer in charge.
The Contractor shall at all times during progress of the work take all requisite precautions and use his best endeavours for preventing and riotous or unlawful behavior by or amongst the workers and other persons employed on the work and for the preservations of peace and protection of the inhabitants and the security of property in the neighborhood of the work.
The contractor shall if required by the Engineer in charge deliver to him a return in detail in such form and at such intervals as the Engineer in charge may prescribe, showing the supervisors and labour employed by the contractor on the site.
The contractor shall if required by the Engineer in charge deliver to him a return in detail in such form and at such intervals as the Engineer in charge may prescribe, showing the supervisors and labour employed by the contractor on the site.

The contractor shall make his own suitable arrangement for lodging and boarding of his labour, supervisors and engineers.

7.3 Site books

For the purpose of quick communication between the Engineer in Charge and the Contractor, site books shall be maintained at all sites, where work is being carried out, so as to be readily available. Any instructions or order which the Engineer in Charge may like to issue to the Contractor may be recorded by him in the site book and two copies thereof taken by him for his record. At the work site "Site Book" shall invariably be maintained. Period of hindrance of execution of work with detailed reasons of hindrance shall also be maintained in the site book. The site book shall be issued by the authority executing the agreement and shall be numbered. Every page of the book shall also be numbered. Format of Site Book is enclosed at **Annexure 'A'.**

7.4 Display Board at Construction Site

The contractor shall erect a display board at construction site as directed by the Engineer-in-charge. In this display board information duly written in Hindi shall be displayed. Location of board at implementing site should be at such a place, where it is visible to people. Location should be such, where people can reach and read easily. Size of letters should be such that one with normal vision can read from reasonable distance. Selection of place for such display board should be such that neither local law is violated nor it may become hurdle to traffic or any other ongoing public activity. Format of Display Board is enclosed at **Annexure 'B'.**

8. DESIGN AND DRAWINGS

8.1 General Design Obligations

The Contractor shall be deemed to have scrutinized, prior to submission of bid, the Department's requirements (including design criteria & drawings & calculations, if any) for their correctness, accuracy, structural safety and soundness. The Contractor shall be responsible for the correctness, accuracy of all designs and for safety & soundness of all structures constructed under this contract.

The department shall not be responsible for any error, in accuracy or permission of any kind in the Department's requirements as originally included in the contract. Any data or information received by the Contract, from the department or otherwise, shall not relieve the Contractor from his responsibility for the design and execution of the works.

The details of materials indicated in the tender document are the minimum requirement, and no reduction/alteration shall be permissible unless the Engineer-in-charge is satisfied that such changes are necessary.

8.2 Contractor's Documents & Submission Procedure for Detailed Design & Execution Drawings

The Contractor's Documents shall comprise the Technical Documents specified in the Departments requirements, Documents Requirement to satisfy all regulatory approvals and As Built Documents and Operation & Maintenance Manuals. The Contractor's Documents shall be written in the language for communications defined in contract.

If errors, omissions, ambiguity, inconsistencies, inadequacies or other defects are found in the Contractors Documents, these and the works shall be corrected at the Contractor's cost, notwithstanding any consent for approval under this clause.

The contractor is required to carry out the detail survey of the construction sites and pipe line alignments and the same shall be submitted to department for approval. The contractor is required to carry out the soil investigation for ESR/GLR/CWR/PH and other important structure and to submit the detailed structural designs and execution drawings (wherever required) all civil, mechanical and electrical engineering works. He will also submit the detailed system and working drawings as well as performance curves and data for all hydraulic, mechanical, electro-mechanical and electrical equipment.

No work shall be commenced on site on the basis of designs & drawings not approved by department and/or those not accepted by the contractor..

If any changes are desired by him in the given designs & drawings, such changes, duly done in the drawings with a detailed note justifying the proposed changes, shall be submitted for approval. No work shall be

commenced on site on the basis of designs & drawings not approved by department and/or those not accepted by the contractor.

The drawings shall be sufficient in details and the scale has to be chosen accordingly in co-ordination with the engineer in charge.

If required, the changes in design and the execution drawings proposed by the contractor shall be submitted only after verification by an institute or agency approved by the Engineer-in-charge or any authorised representative of the Department.

8.3 Approval procedures

The submission of designs, working drawings and documents etc., done as per the requirement of the tender documents to the competent authority or his authorized representative. The department shall progressively review them for an approval within 15 days. The period of review will be counted after all quarries are replied satisfactorily. The schedule should be such so as not to obstruct the actual construction work.

The following shall be the procedure for submission and approval of design, execution drawings & contractor's documents:

The Contractor shall submit three copies of design/drawings/contractor's documents to the Engineer in Charge along with the relevant IS codes / manuals and soft copy of design. Calculations of design in soft copy shall be on excel sheet with stepwise explanation of formulas, various assumptions, calculations etc. to arrive at results of design. In the soft copy of submissions formulas & calculations shall not be kept hidden. Without such submission no design & drawing will be accepted. All the submitted papers are to be signed by the Contractor or his authorized representatives.

The Engineer in Charge will review the submissions and if found fit for approval, will approve them and return one copy to the Contractor within 15 days duly signed in token of approval.

In case the design/drawings etc. are not found fit for approval, the Engineer in Charge will mark the comments on them and return two copies to the Contractor within 15 days and the same shall be repeated till the submissions are finally approved as per scope of work & specifications. The contractor in such cases shall submit the revised and corrected submissions within 15 days to the receipt of comments from Engineer-In-Charge.

On request of the Engineer in Charge, the Contractor shall depute the design engineer responsible for the particular submission to discuss with the Engineer in Charge or his Representative.

On receipt of approved submissions, the Contractor shall submit four (4) additional copies of the approved submissions (designs, drawings, data sheets etc.) to the PHED for reference and records.

No designs / drawings with corrections made after taking the prints will be accepted.

The approval along with alterations in drawings/designs by the Engineer in Charge shall not relieve the Contractor of his responsibility in terms of the Contract for soundness of the designs. The Contractor shall be responsible for the structural safety of all the components of the Work.

8.4 Discrepancies between Drawings and Specifications

In case of discrepancies between drawings and specifications or data sheets arising from the meaning, dimensions or quality of the materials and equipment for the due and proper execution of the Work, the discrepancy shall be explained by the Engineer-in-Charge. His explanation shall be the final decision and the Contractor shall execute the Work accordingly without any extra payment.

8.5 Contractor's Undertaking

The design, the Contractor's Documents, the execution and the completed works shall comply with the relevant standards, building, construction and environmental laws, law as applicable to the product being produced from the works, and other standards specified in the Volume II "Scope of Work & Technical Specifications" applicable to the works, or defined by the applicable laws.

All these laws, in respect of the works shall be, the laws prevailing at the time of letter of invitation. References in the contract to published standards shall be understood to be references to the edition applicable on the date of supply / execution as the case may be.

Whenever there are contradictory provisions in applicable Indian Standards, the most stringent of the provisions shall apply unless specifically mentioned otherwise.

9. SUPPLY OF MATERIAL

All material required for the execution of the work, testing, commissioning, trial run, operation, routine and preventive maintenance and repairs/replacement/, if any necessiated, during the entire Operation and Maintenance period shall be arranged by the Contractor himself except electric charges to be paid to electric company (former electricity board) during O&M period. No material will be supplied by PHED.The contractor shall inform the Engineer in charge about the stipulated source from which he proposed to bring the bricks, coarse aggregate, fine aggregate and water for construction and curing. There upon the quarries and source of water will be approved by the engineer in charge. Even after approval of queries, the raw material shall be got tested at any institution/ organization approved by Engineer in charge. All the expenses of testing shall have to born by the contractor. The frequency of test shall be decided by Engineer in charge.

9.1 Samples

The contractor shall submit samples (except for samples of pumps, motors, bulk meters, valves, control panels as the inspection & testing of these items are to be done in the factory or before dispatch) for their inspection and testing is to be carried out at the factory or prior to dispatch etc. to the Department, for review in accordance with the procedure for Contractor's Documents described in relevant sub clause, as specified in the Contract and at the Contractor cost. Each sample should be labeled as to origin and intended use in the works.

The Department's Personnel or authorized representative shall at all reasonable times:

(a) have full access to all parts of the site and to all places from which natural materials are being obtained, and

(b) during production, an effective and construction (at the site and, to the extent specified in the contract, elsewhere), be entitled to examine, inspect, measure and test the materials and workmanship, and to take the progress of manufacture of equipment and production and manufacture of materials.

The Contractor shall give the Department's personnel full opportunity to carry out these activities, including providing access the facilities, promises and safety equipment. No such activities shall relieve the Contractor from any obligation or responsibility.

The department may opt for third party inspection also in addition to above.

Equipment of similar kind to be used in the contract shall be of same make unless specifically approved by the Engineer-in-Charge. Unless specific approval of the Engineer-in-Charge is obtained, all equipment of one kind, to be used in the project, shall be offered for inspection in one lot. If such equipment are offered in different piece meal lots, the cost of inspection of material in smaller lots will be recovered from the contractor, and the delay caused to the project on this ground, shall solely be attributed to the account of the contractor.

9.2 Inspection of Material

All the material required to be used in the work shall conform to the specifications laid down in details specification or relevant IS codes. For supply of pipe line, centrifugal/ Monoblock pumps, panel board, CID joints, CI specials, sluice valve, reflux valve, M.S. pipes etc. inspection agencies shall be as under :

S.No.	Item	Inspection Agency
1	Pump sets	Third Party Inspection
2	Panel Boards	E.I.C. ExecutiveEngineer, District Rural Division II, Bikaner
3	CID joints, , CI specials, Nut bolts	E.I.C. ExecutiveEngineer, District Rural Division II, Bikaner
4	Sluice valves, reflux valves, foot valves, Air valves etc.	Third Party Inspection
5	uPVC Pipe, C.I. Pipe	QAP shall be got approved from ACE, PHED, Region Bikaner.

		Material will be supplied and stocked in three lots consisting of 40%,30%,30% of total material.
		Random sample as per relevant IS code practice will be collected from the site, got independently tested and pipe lot so tested will be allowed to be used only after finding them correct.

For all Equipment(s) and material(s) required for execution of the work, the arrangement for inspection and expenses thereto shall be borne by the contractor but unless specified otherwise, the charges of inspection agency if any, shall be borne by the department for which initially payment of inspection fee to the inspection agency appointed by the department shall be made by the contractor which will be reimbursed in the subsequent bill to the contractor.

9.3 Testing

The Contractor shall provide all apparatus, assistance, documents and other information, electricity, equipment, fuel, consumables, estimates, labour, materials, and suitably qualified and experienced staff in relation to supply of material and are necessary to carry out the specified test efficiently. The Contractor shall agree, with the Department, the time and place for the specified testing of any equipment, materials and other parts of the works.

The Department may, vary the location or details of specified test, or instruct the Contractor to carry out additional tests. If these varied or additional tests show that the tested equipment, materials or other workmanship is not in accordance with the contract, that cost of carry out in this variation shall be borne by the contractor, notwithstanding other provisions of the contract.

The Contractor shall promptly forward to the Department duly certified reports of the tests. When the specified test has been passed, the Department shall endorse the Contractor's test certificate, or issue a certificate to him, to that effect.

9.4 Rejection

If as a result of an examination, inspection, measurement or testing, any equipment, materials, workmanship is found to be defective or otherwise not in accordance with the contract, the Department may reject the equipment, materials, designs or workmanship by giving notice to the Contractor, with reasons. The Contractor shall then promptly make good that effect and ensure that the rejected items are replaced in compliance with the contract.

If the rejection and re-testing cause the Department to incur additional costs, the Contractor shall pay these costs to the Department.

9.5 Approval of Material and Equipment

The fact that the Contractor has agreed to provide the material prescribed in the Tender Documents does not release him to ask for the final approval of the equipment and material to be used for the Work. The specifications and drawings of each item to be supplied shall be individually scrutinized and the Engineer in Charge shall verify its conformity with the technical specifications and the standards.

Prior to ordering any material and equipment such as pipes, specials, measuring equipment's, mechanical and electro-mechanical equipment, electrical equipment, material for civil works and interior decoration, paints, etc. the Contractor has to supply the detailed specification, drawings, performance curves and data, operation instructions, samples etc., to the Engineer in Charge. If the Contractor has any doubts about the required specifications as prescribed in the Contract, he has to clarify them with the Engineer in Charge.

The procedure for the submission of documents, verification, re-submission if necessary and approval of these items is the same described in relevant clause, If equipment or material which the Contractor submitted first is refused in the approval process he has to submit documents of such equipment which corresponds to the specifications of the Tender Documents and which is likely to be approved.

Only after approval of the material and equipment, the Contractor can place the order or start the manufacturing or purchasing procedures.

Four weeks prior to packing and shipping the Contractor must inform the Engineer in Charge when the material/equipment is ready for inspection and testing. At this date, the Contractor shall supply the results of all manufacturers' own tests made during or after manufacturing and his own quality control certificates. The Engineer in charge will decide whether he or his representative will inspect and test the material/ equipment or whether he will approve it on the basis of the supplied documentation.

Inspection of bought out items i.e. Butterfly valve, Sluice valve, Air Valve, Kinetic Air Valve and pressure reducing Valve or any other electro-magnetic, electrical and mechanical equipment(s) shall be done by department representative(s) and / or a third party appointed by the department. The inspection charges shall be paid as per the provision in clause 9.2 above.

The Engineer in charge will provide an authorization for packing and shipment after inspection and/or approval of the material/equipment.

If the Contractor packs and ships material/ equipment without approval or authorization of the Engineer-in-Charge, it can be refused if it is not matching with the specifications of the Contract. All costs resulting from this are to be borne by the Contractor. The Contractor has then to provide the material/ equipment, which is matching with the Contract

10. COMPLETION OF THE WORK

10.1 Time for completion

The whole of the work, including mobilization, reconnaissance, design, manufacturing, transportation, installation / laying & jointing of pipes, testing, commissioning and trial runs, and demobilization has to be completed within a period of **6 months** calculated from the commencement date, which is 10 days after the written order to commence the work. The duration of the trial runs, tests and commissioning period is included in the completion period, defined in clause 2 of the General Conditions of Contract. The defect liability period of 1 year shall commence from the date of issue of completion certificate from Engineer-in-charge. As per the provisions in clause mentioned below, the contractor shall submit a detailed time schedule for all the activities to be completed under the contract. This schedule shall be updated in each monthly meeting. However, this time schedule shall not bear any implications on the provisions of clause 2 of Gen. Conditions of Contract.

10.2 Sectional and Total Physical Completion

The part of work or section thereof shall be treated as physically completed when the work or part of work or section thereof as envisaged in the Contract and essential as per site conditions, is complete and has been successfully tested sectionally or entirely under non-operation conditions to the satisfaction of the Engineer in Charge. He shall issue a Sectional Completion Certificate to the Contractor in which he shall certify the date on which the work, part of work, or section thereof has been physically completed to the satisfaction of the Engineer in Charge.

Certificate for Total Physical Completion shall be issued when all the works as envisaged in the contract and essential as per the site conditions are completed in all respect to the satisfaction of Engineer-in-Charge and the pipeline, pumping stations and all other ancillary systems are sectionally tested successfully, test gaps are closed and interconnections/connectivity made as required.

The issuance of the Sectional Completion Certificate or Total Physical Completion does not release the Contractor from his duties to maintain the work in the condition as on dates of these sectional or total physical completions, until the end of the defect liability period.

10.3 Completion of work and fully commissioning

Immediately after the physical completion, the work of testing and commissioning the entire system on design conditions as per the procedure of test given in Volume II "Scope of Work & Technical Specifications" shall be taken up. Once the entire system has been successfully tested and commissioned as per the conditions of tests of commissioning referred in Volume II "Scope of Work & Technical Specifications", the trial run period shall commence. After successful completion of the trial run period of one month, and removal of all visible defects to the satisfaction of Engineer-in-Charge, the work shall be treated as "Completed".

Unless otherwise provided in the contract, after the successful completion of the testing for the entire system,

the Engineer-in-charge shall issue a certificate of "Completion of Work". The date of Certificate notifying "Completion of Work" will be used for the final payment as per clause 6 and 7 of General Conditions of Contract. From this date of certificate for "Completion of Work", the Operation & Maintenance period (including defect liability period) shall commence.

10.4 Defects liability period

The defect liability period shall be of **12 months**, from the date of issue of the certificate for Completion of works as per clause. The Contractor shall operate & be responsible for satisfactory performance & maintenance of the under all design and operation conditions for the duration of the defects liability period, except for damage due to unprecedented natural calamities. During the defect liability period the contract has to provide for additional training of the department staff and have to carry out the operational, maintenance and repair activities.

Constructional defect such as defects due to premature use of materials, works not executed in accordance with the Contract, hidden faults in material and equipment not discovered during inspection and testing, fault in design, manufacturing, erection and in construction shall be pointed out by the EiC and shall have to be rectified by the contractor during this period. The cost for repair material, spare arts, transport, repairs, tests and repair staff shall have to be borne by the contractor. If the Contractor fails to rectify the defect within a period of 15 days after aforesaid notice, the Engineer in Charge may forfeit the security deposit or an amount thereof required for the rectification through a third party without prejudice to any other right the Department may have against the Contractor in respect of his failure to remedy such defects.

In the case of delayed "Completion of Work" not caused by the Contractor, the defects liability period shall be extended accordingly but not more than two (2) years after the total physical completion of the entire Work, whichever is earlier.

10.5 Defect Liability Period If Use and operation is done before completion of work but after Total Physical Completion

The Engineer in Charge shall be entitled to operate any section or sections after Total Physical Completion but before Completion of work and thereupon the Engineer-in-Charge shall issue a certificate in respect thereof to the Contractor. The defect liability period and operation & maintenance period in such a case shall start from the date of start of operation. The defect liability period shall end one (1) year after the date of such operation.

In this case, the Department at any appropriate time may ask the contractor, to perform the required test for "Completion of Work" as per clause 10.3 above during the defect liability period. If the Contractor fails to perform the test for "Completion of Work", he will be liable for action as per General Conditions of Contract.

10.6 Cost of Water and Electricity for Testing

For all sectional testing(s) in the contract, the contractor shall be liable for all payments against the arrangements for such sectional testing(s), including the cost of water and electricity.

Water and Electricity for the tests of "Completion of Works" shall be arranged by the department. The raw water, power charges and cost of water treatment chemicals for this test(s) will be provided free of cost. All other charges for the lubricants, operational and maintenance staff or any other direct or indirect charges incurred by the Contractor for such test shall not be paid by the Department and if the test is performed during O & M period in operation along with defect liability period, no deduction shall be made on this account.

11. AS-BUILT DRAWINGS

The submission of the as-built drawings for the equipment is the precondition for the final payment. The final drawings shall be submitted in one reproducible set and 5 copies on linen bound in an album of an approved size. The contractor shall submit all the completion drawings and approved design calculations on CD ROM / DVD in two copies with proper directory structure.

The contractor shall prepare, and keep up to date, a complete set of "as built" records of the execution of the works, showing the exact as built locations, sizes and details of the works as executed. The records shall be kept on the site and shall be used exclusively for the purpose of this sub clause. Two copies shall be supplied to the Department before the commencement of the tests on completion.

In addition, the contractor shall supply to the Department as built drawings of the works, showing all works as executed, and submit them to the Department for review under sub clause [Contractors Documents]. The Contractor shall obtain the consent of the Department as to their size, the references system, and other relevant details.

Prior to the issue of Completion of works certificate, the contractor shall provide to the Department the specified numbers and types of copies of the relevant as built drawings, in accordance with the Department's requirements. The Completion of works shall not be considered until the Department has received the As Built Drawings.

12. OPERATION AND MAINTENANCE MANUALS

Prior to the commencement of the tests on completion, the contractor shall supply to the department provisional operation & maintenance manuals in sufficient detail as specified in Vol II 'Scope of work & Technical Specifications', of the tender document.

The works shall not be considered to be completed for the purposes of completion of works until the department has received final operation & maintenance manuals in such detail.

13. PROGRESS OF WORK

All components of works shall ensure a logical sequence of execution, construction, supply, installation, testing, and commissioning. If any supply / construction of a material / unit is made, not in conformity to the logical sequencing of the work component, no payments will be entitled against such supplies, construction and installations.

There has to be a continuous chain of work to ensure that pipes / material supplied by the contractor are laid / installed promptly and those laid / installed are sectionally tested in the field without any delay.

If however, the progress of the work is hampered unavoidably, due to reasons beyond the control of the contractor, payment against supply shall be admissible against submission of appropriate Bank Guarantee of any scheduled bank. However such circumstances for not testing the pipes / reservoir shall be subjected to verification of the reasons, in the progress of the work, not being attributable to the contractor by an officer not below the rank of Superintending Engineer of the circle under whom the jurisdiction is vested.

It will be the responsibility of contractor to maintain simultaneous pro-rata progress of works.

14. DOCUMENTS REQUIRED FOR PAYMENT

The contractor shall submit the following documents in duplicate along with the invoice/bill.

i. Purchase invoice indicating details of equipments, material manufactured, supplied and installed or work carried out, supply value of such material or equipment or value of such work carried out and amount claimed.
ii. Inspection reports/ test reports/ reports certifying completion of activity with acceptable results as per PHED or any other agency representing PHED.
iii. Report/certificate of inspections /tests carried out by the supplier of the contractor or by the contractor himself.
iv. Any other such details/documents as may be reasonably specified by the Engineer-in-Charge from time to time during execution of the contract.
v. Proof of insurance of equipments, as required.
vi. Certificates, as prescribed, regarding payment of Sales Tax, duties etc. leviable on supplies made.
vii. Colour photographs of the work executed during the period for which the invoice has been raised.
viii. Other documents required by the Engineer-in-charge.

15. PAYMENT TERMS

The terms of payment shall be as detailed herein after. All payments due under this contract shall be subjected to the following limitations:

Sequence of event in case of supply of material:

Sequence of events shall be decided in the monthly review meetings, and material requirement for subsequent 3 months shall be decided and made part of the monthly reports. Payment for supply of items in consonance with the agreed sequencing of material will only be made, so that material does not remain unutilised for more than 3 months, for which payment of supply has been made.

Payment of material and equipment shall be done for the price quoted for respective items in the volume IV "Schedule of Prices" of the tender document and as provision given herein after.

16. DEDUCTIONS

16.1 Statutory deductions

The Department is required to make statutory deductions at source from all running bills and final bill as in force through relevant statutes in force from time to time at the rates prescribed therein.

16.2 Other deductions

Any other deductions to recover any reduction in rates or any other Department's claims accrued as per the contract or in respect to any other liabilities arising, shall be deducted from subsequent interim payments or final payments or from the securities with the Department.

17. NON APPLICABLE CLAUSES OF GENERAL CONDITIONS OF CONTRACT

The clauses of General conditions of contract bearing nos. 5A, 10, 10B, 10C, 12, 12A, 24, 25, 30, 37(a), 37(b), 37(c), 45, 45 A and table for schedule of material to be supplied by the deptt. If available, (referred to in clause 10) of general conditions of contract shall not be applicable.

18. TAXES AND DUTIES

All taxes, duties, levies applicable by any act of the Government of India and/or State of Rajasthan and/or of the local bodies on the company or its personnel, during the period of work in progress shall be of the Contractor. Labour tax as applicable shall also be deposited by the contractor.

All goods manufactured/procured and supplied by the contractor and the work executed under this contract, responsibility of payment of sales tax, surcharge, octroi and any other tax and levies in force, responsibility of payment of all such taxes, duties, levies shall be of the contractor.

In respect of goods and materials procured by the Contractor, for use in works under the contract, sales tax will be paid by the Contractor himself. But in respect of all such goods manufactured and supplied by the Contractor and works executed under the contract, the responsibility of payment of sales tax if is of the Engineer-in-charge as per the statutory provisions, than the sales tax for such cases shall be paid by the Engineer in Charge on behalf of the contractor and the amount so paid shall be deducted from the intermediate payments of the contractor.

19. DEPARTMENT'S RIGHT TO RECTIFY

The Department retains the right, at the cost of Contractor, to perform any of these materials or work obligations on default of the Contractor.

20. SCHEDULE OF PAYMENTS

All payments related to the execution part of the project, shall be made on the principle mentioned below.

20.1 For Material & Equipment

All materials and Equipment except pipe such as pipe appurtenances, flow meters, valves, specials, actuators, electrical equipment, mechanical equipment, instrumentation equipment, etc. which are required to be supplied and installed under this contract shall be paid as per the following breakup, subjected to the deductions as per the general and special conditions of contract:

(a) 70 % Payment

On receipt of material in good condition at site after all the required tests at the manufacturer premises, acceptance of the inspection report, other papers/warranties, required as per the conditions of contract.

(b) 20 % Payment

After installation and erection of material at site

(c) 10 % Payment

On successful pre-commissioning test performed as per the provisions given in the Chapter for "Pre-Commissioning tests" of other material/ equipment installed at site and commissioning of equipments.

20.2 For pipeline work

For providing HDPE pipe line

a) 90% after receipt of material in good condition, its laying, jointing/erection / installation at site and sectional testing of pipe line (including all the tests required in the manufacturer premises, acceptance of the inspection & testing reports, submission of other papers/ warranties required as per the conditions of contract for the material supplied).
b) 10% after successful commissioning of work, final site clearance and complete trial run.

There has to be a continuous chain of work to ensure that pipes provided are laid promptly and those laid are sectional tested in the field without any delay. If however, the progress of the work is hampered unavoidably, due to reasons beyond the control of the contractor, payment against additional supply, without laying, shall be permissible after submission of appropriate Bank Guarantee of any scheduled bank. Such circumstances for not laying /testing the pipes and/or erection of equipment shall be subject to verification of the reasons not being attributable to the contractor by an officer not below the rank of Superintending Engineer of the circle under whom the jurisdiction is vested.

In consideration to the fact that the pipe lengths mentioned in the tender are the lengths based on preliminary survey and the actual length in work may vary, it is intended that the variation in lengths observed during execution shall be suitably adjusted at the end of the contract. For this purpose, the rates payable / deductible for increased / decreased lengths as compared to those given in schedule, shall be same as quoted for the respective pipe in schedule A1.

20.3 For material & Equipment which does not require installation

(i) For material & Equipment which does not require installation like furniture, portable meters etc:

100 % , on receipt of material in good condition & receipt of invoice with all the necessary documents.

(ii) 100 % payment shall be made of tools & tackles, spare parts after inspection at store & receipt of material in good condition.

20.4 For OHSR

S. N.	Items	% of Unit Cost
1	Excavation, laying of PCC, foundation raft and completion of work of foundation up to ground level	15%
2	Completion of staging height below bottom ring beam	15%
3	Completion of bottom ring beam, bottom dome, S&F CI puddle collars in dome, conical wall, balcony and stair up to this position	20%
4	Completion of vertical wall of tank	10%
5	Completion of top dome with ring beam	10%
6	Supply of CI D/F pipes, Valves and other material as specified in scope of work	10%
7	Fabrication of MS ladders, lightening arrestor, water level indicator, railing, manhole cover, ventilator, fixing CI D/F pipes with accessories, testing of water tightness as per Scope of work.	10%
8	Construction of Plinth protection, finishing the tank with cement paint, metal parts with enamel paint, black japan paint on CI parts, satisfactory testing and final site clearance including interconnection with distribution system as per Scope of work	10%

20.5 For Civil Works

The payments for the civil works shall be made of the particular unit as per prorata progress in accordance to actual measurements of executed items of G-Schedule as per specifications, drawing & satisfaction to Engineer-in-charge. The statutory deductions shall be made as per rules.

21. MAKES OF EQUIPMENT

The Equipment(s) used by the bidder for the project shall be one of the following makes given for each equipment, in Annexure "C" to this section of the special conditions of contract & as approved by the Technical Committee of RWSSMB, Jaipur. The makes of other equipments/material to be used shall be got approved from EIC.

22. TIME SCHEDULE FOR CONTRACT ACTIVITIES

For completion of the job in the prescribed time it is essential to maintain a timely and logical sequencing of the contract activities. In view of the above the contractor shall submit a plan for approval of department.

To adhere to the execution schedule approved by the department, the contractor shall also deploy the required T&P as directed by Engineer in Charge. The time schedule so provided and approved by competent authority shall have no bearing on clause 2 of General Conditions of Contract.

23. INSURANCE

The contractor shall have to provide a minimum insurance of man power and equipments. This insurance cover should start from the date of starting of work and should be valid up to end of execution period. The responsibility of timely payment of the premium as well as that of lodging claims as and when situation arises will be that of contractor.

23.1 Accident or injury to contractor's employees

The PHED shall not be liable for, or in respect of any damages or compensation payable by law in respect of, or in consequence of any accident or injury to any person in the employment of the contractor (other than acci-

dent or injury as may be attributable to the PHED or its employees) & the contractor shall indemnify the PHED against all such damages and compensations and against all actions, suits, claims, cost or expenses arising there from. The contractor shall insure against such liabilities and shall continue such insurance during the whole of the time that any persons are employed by him on the works.

23.2 Third party insurance

Before commencing the execution of the work, the contractor shall insure and indemnify the PHED against all damages, loss or injury and any actions, suits, claims, demands, costs and expenses arising there from which may occur to any property including that of PHED) by, or arising out of the exhibition of any work for which shall be occasion by the negligence of the contractors' employees or by defective design, materials or workmanship, or from any other cause for which the contractor may be held liable under the contract. Such insurance shall be unlimited during any period of insurance and to Rs. 1000000/- in respect to any one claim.

23.3 Approval by the engineer in charge

All insurances which the contractor requires to enter into the contract shall be effected with an insurer or insurers and in terms approved by the engineer in charge, (which approval shall not be unreasonably with held), and the contractor shall automatically produce to the engineer in charge the policies of insurance and receipts of the payments of the premiums.

23.4 Remedy on contractor's failure to insure

If the contractor fails to effect on keep in force the insurances referred to or any of the insurance which he may be required to effect under the term of the contract then and in any such case the PHED may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for the purpose, and from time to time deduct the amount so paid by the PHED as aforesaid, from any moneys due or which may become due to the contractor or recover the same as a debt due from the contractor.

Executive Engineer
PHED District rural Division II, Bikaner

SPECIAL CONDITIONS OF CONTRACT –PART "B"

1. DEFINITIONS

1.1 Adverse Operating Period

The period, during which clear water and/or electricity are/is not provided by the department.

1.2 Billing Period

Billing Period means each calendar month, except:

(1) For the first Billing Period shall begin on the Date commencement of contract as defined in clause 1.3 below and shall continue till the last day of the respective month;

(2) The last Billing Period shall start on the first date of the month of expiry of contract and end on the date of expiry of contract as defined in clause 1.10 below.

However, no payment, against O&M, shall be made during the Defect Liability Period, which is the first year of the O&M period. In this contract, there is no provision of operation and maintenance after Defect Liability Period.

Any computation made on the basis of a Billing Period shall be adjusted on a pro rata basis to take into account any Billing Period of less than the actual number of days in the month to which such Billing Period relates.

1.3 Commencement of O&M Period

From the date of Completion of works as per clause 10.3 of Special Conditions of contract Part 'A'.

However, O&M for additional period to the part/ section(s) as defined under clause 10.5 of special conditions of contract Part 'A' shall also be under taken by the contractor for which he would not be entitled to claim for any extra payment towards it.

1.4 Operation and Maintenance Contract Period

One (01) year from the commencement of O&M period as per clause 1.3 above or as extended in accordance to clause 2.1. Operation and maintenance will run alongwith the defect liability period.

1.5 Date of Issue of Taking Over Certificate

After the completion of Period, for contract as per clause 1.4 above, provided that the contractor has fulfilled the provision of clause 2.2 of this contract.

1.6 Good Engineering Practice

In respect of the Contractor, its subcontractors, and all other such third party agents of the Contractor, practices, methods, techniques and standards, as changed from time to time, that are generally accepted for use internationally for water treatment facility, pump house along with its electrical &-mechanical equipment(s), all type of pipe line and pipe appurtenances, all type of meters and control equipment(s), power sub-stations, and all other facility during construction, development, operations and maintenance, taking into account conditions in India.

1.7 Non-conformance Event

Any occasion on which the Contractor does not supply the notified per day flow to the respective OHSRs.

1.8 Operation and Maintenance Completion Certificate

As defined in Clause 2.2.1 of this Project.

1.9 Operations and Maintenance Services

All Services which are the responsibility of the Contractor and are required to fulfil the obligation as detailed in "scope of work" given in Vol. II of bid document and/or in the approved operation and maintenance manual and as defined in any other clauses of this contract.

1.10 Expiry of Contract Period

As per Clause 1.4 above (or) as extended, as per the provisions of Clause 2.2.

2. Extension & Expiry of Contract

2.1 Extension of Operation and Maintenance Period (Not applicable)

The Operations & Maintenance Period can be extended for a period further based on such terms as acceptable to both Parties ("The Contractor" and the "Department")

In such an event, either Party ("The Contractor" or the "Department") shall notify its intention to extend the Operations & Maintenance Period at least six months before its expiry and commence discussions with the other Party to arrive at a mutually agreed basis of terms and conditions for the extended period.

2.2 Expiry of the Operation and Maintenance Period & Taking Over By the Department

2.2.1 Six months prior to the expiry period, the Department will notify the contractor, the maintenance required for the facilities including all structures and road, plants, materials and equipment(s) therein, so that the facilities may be taken over in an acceptable physical conditions (physical conditions in reference to the initial physical condition at the start of O&M period, after accounting reasonable wear and tear during operation) and in operation conditions.

2.2.2 Not withstanding to the notification done by department as per clause 0 above, the contractor shall repair, maintain and operate the facilities as per the terms and conditions of this contract, till 12.00 Noon up to the date of expiry of contract period.

2.2.3 The contractor, shall be liable for all defects, faults, break-downs etc occurred or noticed prior to the 12.00 Noon, up to the date of expiry of contract, even if the facilities are taken over by the department subsequently, due to expiry of contract period, as per clause 0 above. However, the Department has to notify all such defects/liabilities of contractor within 30 days of taking over of facilities.

2.2.4 Till the date of expiry of contract period, the contractor shall do all routine and periodic/breakdown maintenance as prescribed in the O&M manual, in force, at the time of expiry of contract.

2.2.5 On expiry of contract (execution period), the contractor shall hand over all spares, tools and for which he has been paid.

2.2.6 After, expiry of the contract, the contractor shall provide 12 copies of the updated O&M manual. The components of communication system used during O&M period in operating condition, the T&P required for maintenance of facilities. The logbooks and all the other records prepared during the O&M period shall be handed over to the Department, in acceptable electronic formats and in hard copies, within 15 days of expiry of contract. Copy of the log books related to performance of units shall be provided every month.

2.2.7 If the contractor does not comply with any of the provisions from 0 through 2.2.6 above, or any other requirement in pursuance of Good Industrial Practices, the Engineer –In-charge shall estimate the cost of liabilities due to violation of any of the provisions of this contract. Such estimates made by Engineer-In-Charge shall be final and binding for the contractor. However in a reasonable endeavor, such estimates shall be communicated to the contractor, within 30 days of expiry of the contract. The contractor shall be given an opportunity to rectify the damages through his staff/agents, or for supply of required material provided such rectification of defects on maintenance do not require any shut down of the system, within 60 days of such notification of estimates by department.

2.2.8 Within 120 days of expiry of the contract period as per clause 1.10, the Department shall prepare the final estimates for recovery from the contractor and shall prepare the final bill for the work.

2.2.9 If the recoveries to be done by Department are more than the final bill to be paid, the contractor shall deposit the required amount to be recovered from contractor or this amount shall be recovered from the securities/guarantees etc. with the department as deemed suitable.

2.2.10 After the date of expiry of contract and recoveries of all dues payable by the contractor, the Engineer-In-Charge shall issue a "Certificate of Taking over."

3. PAYMENTS (Not applicable)

3.1 Basic Service Charge (BS)

The Basic Service Charges shall comprise all expenses for operation and maintaining the Facilities, as provided in the scope of work for O&M in Volume – II of "Scope of Work and Technical Specifications" of bid document. In addition to the cost of material/equipment spares, repair/replacement of equipment

and labour, all other expenses such as expenses for patrolling, administration and management, permanent & temporary staff, running office, maintenance of all structures, updating of operation and maintenance manual etc. and all other incidental and indirect expenses for the works detailed in "Scope of Work for O&M" in Vol-II or for works otherwise required as per good engineering practices for Operation and Maintenance of the entire system, (except for the cost of chemicals, consumables and electricity) are included in this Basic Service Charges. The Basic Service Charge shall be a lump sum charge to be quoted by Contractor at the time of bidding in Schedule of prices in Volume IV of bid document.

3.2 Reduction OF RATES (RR)

3.2.1 Reduction in rates for not maintaining power factor

The contractor shall maintain the power factor for respective motor and complete system as specified. If low power factor leads to any surcharge by the power supply companies, the contractor shall be liable for deduction equivalent to the surcharge/ penalties / levies etc. imposed by the power supply company for not maintaining the required power factor. However, benefit of incentive if accrued will not be credited to the contractor.

3.2.2 Reduction in rates For Inefficient Operation of Pumping Machinery

Throughout the O&M period, the contractor shall ensure operation of the pumping machinery within 5% of the efficiency of pump, as per its approved Performance Curve, at the time of supply.

Example: If pump efficiency as per approved performance curve is 70%, allowable tolerance in operating efficiency shall be 70 X 5% = 3.5%.

Every month, the actual energy consumption of the pumps shall be compared with the energy consumption based on the pump curve and quantity of water pumped & average operating pressure during the month.

In case the actual energy consumption of the pumps, during a month, exceeds the energy consumption calculated with allowable tolerance in efficiency as per clause 3.2.1.2 above, the cost of excess energy charges shall be deducted from the monthly O&M charges to be paid to the contractor.

The required power factor must be maintained by the contractor during commissiong and O&M period. If any penalty is proposed by the JdVVNL, same will be recovered from the contractor.

3.3 Billing and Payment procedure

Commencing with the first Billing Period of the Operations & Maintenance period and for each Billing Period thereafter during the Operations & Maintenance Period, the Department shall pay the Contractor a Service Fee for the services provided by the Contractor under the terms of this Conditions of Contract for Operation and Maintenance. The Contractor shall prepare and submit to the Department, for each Billing Period, invoice for payments receivable by the Contractor with all supporting documents. The calculations shall be submitted between the first and fifth working day of the month for the preceding month.

THE PAYMENT SHALL BE IN ACCORDANCE WITH THE FOLLOWING FORMULA:

SF = BS - RR

Where:

SF = Service Fee

BS = Basic Service Charges, as per clause 3.1

RR = Reduction in Rates or any other deduction as per terms and conditions of contract

The Fee payable shall be computed in accordance with this Clause and shall be adjusted from time to time, due to the provisions of clause 3.2 or any other provisions in the contract. The Service Fee is and shall be considered to be a Single Fee payable for O&M of the system. The Department shall pay the Contractor the Service Fee with respect to each Billing Period during the Operations & Maintenance Period, but shall have no obligation to pay the Service Fee till the commencement of O&M period as per clause 1.3. The Service Fee constitutes the entire compensation of the Contractor for performing the Operation & Maintenance Services, as per the scope of work and other obligations due to this contract. The Department shall pay to the Contractor the Basic Service Charge, whether and irrespective of the availability of Water in CWR and electricity to the Contractor for transmission hereunder, as provided in Clause 0 & 4.1.4.

3.4 Taxes and Duties

The Contractor shall be responsible for paying all taxes/duties including service tax, cess or any other levies imposed by the Government and assessed as due and payable by the Contractor associated with the carrying out of the services. Notwithstanding the provisions of any Clause of this Conditions of Contract for Operation and Maintenance, the Department shall be entitled to withhold or deduct from payment to the Contractor any amount demanded by the competent authority.

All statutory deductions shall be made from all the payments done to the contractor.

3.5 Security Deposit

The provisions of Clause 1 of General Conditions of Contract shall apply for the deductions to be made in reference to the Security Deposit.

3.6 Refund of Security Deposit

An amount equal to 10% of department's estimated cost of O&M or the contract value of O&M, whichever is higher, shall be retained on account of Security Deposit for O&M work (Part B) from Security Deposit for execution of Work (Part A), while refunding such Security Deposit. The Security Deposit with the Department shall be released after successful completion of the defect liability period as per clause 10.4 of Special conditions of contract (Part-A) for execution part & after taking over certificate issued in pursuance of clause 2.2 of Special condition of contract (Part-B) for O & M.

4. OPERATIONS

4.1 Variability of Output

Variation in Supplied Water Quantity required by Department

The Department may alter its demand requests made pursuant to this Clause for any reason whatsoever by giving the Contractor a written notice.

Regardless of the quantity of supplied water demanded by the Department, or even if the contractor is not supplying any water due to non-availability of the water in source Canal , the Department shall be liable to pay to the Contractor the Basic Service Charge as defined in Clauses 3.1.

Due to contractor's own inability

If the contractor fails to provide 90% of the required water as notified by the department or as per the designed demand of the village, the contractor shall be liable to compensation, as per clause 3.2.

Non-availability of Water in Source

Throughout the Term of this Condition of Contract, the Department shall be responsible for supplying water in Source.

Notwithstanding the above, pursuant to Clause 0 of this Conditions of Contract, inability of the Department to supply Water shall not construe default by Department.

During such period when the Department supplies no water, the Department shall be liable to pay to the Contractor the Basic Service Charge pursuant to clause 3.1 of this Conditions of Contract.

NON AVAILABILITY OF POWER

If, due to reasons attributable to the Department, adequate power to operate the Facility is not provided, the Parties shall consult in good faith to arrive at mutually acceptable Alternative Output Standards, which shall be complied with by the Contractor till such time adequate power supply to the Facility is restored by the Department.

All power outages equal to or more than 1 hours (total) in a segment of 24 hours (12:00 Noon to 12:00 Noon next day) shall be used for determining pro-rata reduction on Quantum of Water to be supplied as per Departments instructions.

4.2 Personnel

The Contractor shall appoint the minimum staff defined in scope of work of O&M in Volume - II, before the date of issue of Certificate for Completion of work under clause 10.3 of special condition of contract part "A". The appointed staff must have the minimum qualification and experience as defined in the Chapter of "Specifications for Operation and Maintenance" of Volume-II. The names along with the qualifications and experience of the minimum staff to be provided as per the conditions of contract

shall be got approved from the Department. Such approval shall not be unreasonably withheld or delayed by the Department. If during the O&M period any personals earlier approved by Department are required to be changed, the bidder shall provide CV's of personals of similar or more experience than that of the person to be replaced for approval of Department. Only after such approvals, the bidder shall appoint the person on job.

The Contractor's Representative shall be authorised and empowered to act for and on behalf of the Contractor on all matters relating to the rights and obligations of the Contractor during the O&M Period. In all such matters, the Contractor shall be bound by the written communications, directions, requests and decisions given or made by the Contractor's Representative.

The Contractor's Representative will direct and manage the Contractor's resources and have full responsibility for the operation, maintenance and administration of the Facility.

The Contractor shall identify, interview and hire sufficient number of qualified and trained (and if required, licensed) personnel to perform its obligations during the O&M Period.

All Contractor's personnel employed at any time during the O&M period will be provided by the Contractor. The Department is not liable for personnel in any way and cannot be held responsible in the event of litigation of any sort between the Contractor and members of plant personnel or their representatives or non performance of obligations due to any strike or other industrial action by the Contractor's workmen (including those of its subcontractors, suppliers etc).

The Contractor undertakes to comply with applicable legislation and the code of labour law on matters of health, hygiene and safety, and shall assume responsibility for works required in the event of any change in applicable regulations and shall also require its subcontractors to comply with this clause.

If the Contractor fails to provide the minimum personnel responsible for O&M of the Facility as defined in scope of work, given in volume-II, the Basic Service Charge payable for each year may be reduced proportionately to the schedule of deployment of personnel proposed by the contractor or as per the actual expenditure incurred by the Department to fulfill the duties and liabilities of the Contractor under this contract, which ever is more, at Department's discretion.

4.3 Maintenance, Repairs and Replacements and Additions to the Facility

Maintenance, Repairs and Replacements

The Contractor at its own cost and expense shall maintain and repair the Facility in good working condition, in a neat & orderly way including the cleanup of litter and debris on a daily basis or more frequently, shall maintain a spare parts inventory necessary to performance maintenance required as per the Operation and Maintenance Manual and/or scope of work, and shall maintain the aesthetic quality of the Facility as originally constructed and in accordance with the Technical Specifications, with due allowance for reasonable wear and tear and depreciation. The Contractor shall provide or make provisions for all labour, materials, and equipment which are necessary for the normal operation and maintenance of the Facility and shall conduct the required predictive and preventive maintenance of the Facility consistent with the Operation and Maintenance Manual and/or scope of work. The Contractor shall maintain maintenance logs in accordance with the preventive maintenance plan set forth in the Operations and Maintenance Manual and as defined in scope of work and shall produce monthly copies of the same to department.

Additions/Modifications to the Facility

Any additions to the Facility sought by the Department, over and above those required to meet the Contractor's obligations under this Contract, including but not limited to expansion of the Facility, shall be carried out by the Contractor at the expense of the Department on mutually agreed terms and conditions. Such agreement will cover the costs of maintenance of the additional facilities also. The Department shall also bear any incremental expenses (along-with the percentage fee for the Contractor) required to maintain such additions during the O&M Period. The Department may opt for other sources for construction and maintenance for such additions.

4.4 Department's rights

INSPECTION

The Department may periodically check the operation of the Facility or designate an organisation of its choice at the cost of Department to carry out inspections of the Facility to satisfy itself that the Contractor is performing its obligations with due diligence.

Any assistance required for such inspection of the Facility shall be provided by the Contractor at its own cost.

The Department representative can inspect the facility at any moment during the O&M period.

4.5 Responsibilities of THE DEPARTMENT

The Department will provide:

Water in Source for required pumping hours

Power shall be supplied to the Facility at PS, as per designed pumping hours. Power shall be supplied to the Contractor solely for the purpose of pumping of water, and for other utilities within the pumping station and for the other utilities desired by the Department and not for any other purpose.

4.6 Other Contracts

The Contractor shall not delegate its responsibilities hereunder nor subcontract any part of the services to be provided by him hereunder without the prior written consent of the Department. If the Contractor subcontracts its responsibilities hereunder or subcontracts any part of the services to be provided by him hereunder with the consent of the Department, the Contractor shall not be relieved from any liability or obligation under this Contract and the Contractor shall continue to be responsible for the act, defaults or negligence of any sub-contractor as fully as if it were the acts, defaults or negligence of the Contractor, its officers, employees or agents.

The period of validity of any contractual commitment for provision of services or material or personnel to the Facility or any subcontract entered into by the Contractor with any party shall not and shall not extend beyond the Termination Date.

All such contractual commitments to be entered into by the Contractor should be freely assignable to the Department or to any other contractor, at the discretion of the Contractor.

The Contractor cannot create a charge on any assets of the Department or the assets purchased under the Contract.

Executive Engineer
PHED District Rural Division II, Bikaner

Annexure 'A' (Format of site book)

PUBLIC HEALTH ENGINEERING DEPARTMENT

SITE BOOK

1. **Name of Circle:**
2. **Name of Division:**
3. **Name of Work:**
4. **Location of site:**
5. **Name of Contractor:**
6. **Agreement no. & Date:**
7. **Date of Commencement of Work:**
8. **Stipulated date of Completion:**
9. **Details of In-charge of work:**

Designation	Name	Period
SE		
EE		
AE		
JE		

HINDRANCE AND DELAYS

Date of occurrence of hindrance	Details of hindrance	Date on which hindrance was overcome	Responsibility of hindrance	Signature of site in-charge with designation
(i)	(ii)	(iii)	(iv)	(v)

Inspection notes & orders of Touring Officer

Date of Inspection	Notes and orders with signature and designation of officer making the entry	Signature of contractor or his authorised agent	Subsequent action taken	Signature of site in-charge with designation
(i)	(ii)	(iii)	(iv)	(v)

Annexure 'B' (Format of display board at site)

जन स्वास्थ्य अभियांत्रिकी विभाग

1. कार्य का नाम.....
2. कार्य स्थल का नाम.....
3. स्वीकृत लागत.....
4. कार्य प्रारम्भ होने की तिथि.....
5. कार्य पूर्ण होने की तिथि.....
6. ठेकेदार का नाम व पता.....
7. कार्य का संक्षेप विवरण.....

(यदि कोई शिकायत हो तो टोल फ्री नम्बर 18001806088 पर दर्ज कराएं।)

Annexure "C"(List Of Specified Makes)

LIST OF SPECIFIED MAKES

(Updated up to 31.08.2013)

SN	PARTICULARS OF EQUIPMENT	SPECIFIED MAKES
1.	H.T. MOTORS	KIRLOSKER ELCTRIC CO. LTD. (KEC.) / SIEMENS INDIA LTD. (SIEMENS) / CROMPTON GREAVES LTD. (CROMPTON) / BHARAT HEAVY ELECTRICAL LTD. (BHEL) /GENERAL ELECTRIC CO. LTD. (GEC) /NGEF (NGEF) / SCHNEIDER / JYOTI.
2.	L.T. MOTOR	KEC/GEC / CROMPTON /SIEMENS / ABB/NGEF/JYOTI/ SCHNEIDER / LUBI (upto 45 KW)
3	DEWATERING PUMP	KBL / M&P / KSB / SU
4.	BUTTER FLY VALVE	KIRLOSKER BROTHER LTD / INDIAN VALVE COMPANY/ FOURESS ENGINEERING / ADVANCE / DURGA ENGG./ MAYUR/ R&D / DALUI / JUPITER (UPTO 1600MM) / KARTAR (UPTO 250MM) / AVK / UPADHAYA / MARCK (UPTO 600MM)/ PATSONS/ VAG/ CALSENS
4. (A)	DI Resilient (Soft) Seated BUTTERFLY VALVE	SIGMA FLOW (UPTO 300MM)/ AVK /VAG/JUPITER (UPTO 700MM) / IVC / DVPL
5.	ELECTRICAL ACTUATOR	ROTORK / LIMITORK / AUMA INDIA / MARSH / ENTROK
6.	SLUICE VALVE	KIRLOSKAR BROTHERS LTD., PUNE / INDIAN VALVE COMPANY/ FOURESS ENGINEERING / DURGA ENGINEERING / SHIV DURGA / KEYSTONE / MAYUR / DALUI / R&D / JUPITER (UPTO1200MM) / KARTAR (UPTO 600MM) / AVK / SHIVA (UPTO 600MM) / UPADHAYA / BEW (UPTO 300MM) / PATSONS/ VAG / SACHDEVA (UPTO 1200 MM)/ CALSENS/ HARI (UPTO 250MM)
6. (A)	DI Resilient (Soft) Seated SLUICE VALVE	SIGMA FLOW (UPTO 300MM)/ AVK / BEW (UPTO 300MM) / VAG / JUPIETR (UPTO 450MM)/SACHDEVA (UPTO 1000MM) / SHIVA (UPTO 300MM) / MAYUR (UPTO 300MM) / IVC / DVPL / KARTAR (UPTO 600MM)
7.	SLUICE GATE	JASH / BHARAT INDUSTRIAL CORP./ ORIENTAL / FLUID CONTROLS
8.	DOUBLE PLATE CHECK VALVE	ADVANCE / KBL / IVC / R&D /DURGA / MAYUR / DALUI / PATSONS / VAG
9.	NON RETURN VALVE	KIRLOSKAR BROTHERS LTD., PUNE / INDIAN VALVE COMPANY/ FOURESS ENGINEERING / DURGA ENGINEERING / SHIV DURGA / KEYSTONE / MAYUR / DALUI / R&D / JUPITER (UPTO1200MM) / KARTAR (UPTO 600MM) / AVK / SHIVA (UPTO 600MM) / UPADHAYA / BEW (UPTO 300MM) / PATSONS/ VAG / SACHDEVA (UPTO 1200 MM)/ CALSENS/ HARI (UPTO 250MM)
9. (A)	DI Resilient (Soft) Seated NON RETURN VALVE	AVK / VAG / IVC / DVPL
10.	KINETIC AIR VALVE	KIRLOSKAR BROTHER LTD. / INDIAN VALVE COMPANY / ADVANCE VALVE / INTER VALVE / FOURESS / R&D / DURGA ENGINEERING / SHIV DURGA / MAYUR / DALUI / R&D / SHIVA / UPADHAYA / BEW/ AFT/ PATSONS/ AVK / VAG /CALSENS/JUPITER

10. (A)	DI Resilient (Soft) Seated KINETIC AIR VALVE	AVK / VAG / IVC / DVPL
11.	DISMANTLING JOINTS (TELESCOPIC)	ORIENTAL / SHIV DURGA / SUR INDUSTRIES / DWREN IND. / MANGALA / QUALITECH / SYSTEC FLEXO PRODUCT / DURGA / MAYUR / SHIVA / BEW / PRECISE
12	PAINTS	ASIAN / SHALIMAR / JENSON & NICHOLSON / GOODLAC NEROLAC/ ICL / BRITISH PAINT / CLEAN COATS
13.	COMPPRESSOR FOR AIR VESSEL	ANGERSOL RAND / ELGI / CP
14	AIR VESSEL	L&T / SHRIDHARAN / SURESEAL
15.	EOT CRANES:	EDDY CRANES ENGINEERS PVT. LTD. (EEPL) / ACME MANUFACTURES ENGINEERS (ACME) / M/S ROCKWELL HOIST CRANES PVT LTD. NEW DELHI / REWA / WMI / VIDUT / WH BRADDY/ JAPS
16.	WINDOW AIR CONDITIONERS:	VOLTAS LTD.(VOLTAS) / CARRIER AIRCON LTD (CARRIERS) / FEDDERS LLOYD./ AIRCON / BLUE STAR LTD. (BLUE STAR)
17.	EXHAUST FAN:	BAJAJ ELECTRICALS LTD. (BAJAJ) / CROMPTON GREAVES LTD. (CGL) / GENERAL ELECTRIC CO. LTD. (GEC) / KHAITAN LTD. (KHAITAN) / JAI ENGG. WORKS.
18.	MAKE OF HOIST. LIFTING SYSTEM	EDDY CRANES / ACME / INDEX / JAPS
19.	MECHANICAL FLOW MIXER AND INDICATOR	KENT. SCHLUMBERGER (ACTRIES) / CAPSTAN
20.	FLASH MIXURE	FABCO / PARAMOUNT / HDO / FIBRE & FIBRE / REMI
21.	CHLORINATORS	INDUSTRIAL DEVICES PVT. LTD./ BANACO / ISGECIES FABCAM / CHLOROCONTROL / AQUA / TUSCON JESCO
22.	BACK WASH PUMPS	KIRLOSKAR / M & P / JYOTI / BEACON WIER
23.	BACK WASH BLOWER MAKE & TYPE	FLAKT/ KAY INTERNATIONAL / SWAM / EVERST / ROOTS/ WEEPL
24.	DOSE METERING PUMPS	ASIALMI / SWELLORF / VK
25.	BRIDGE WEIGHGING DEVICE	AVERY
26.	CHLORINE LEAKAGE DETECTION SYSTEM	METIJO
27	SLUDGE PUMP	KIRLOSKAR / M&P / JYOTI / BEACON WIER
28.	RECTIFIER	CANARA ELECTRIC
29.	BATTERY	EXIDE / STANDARD / FUKUWA / AMCO

30.	OUTDOOR LIGHTENING ARRESSTOR	ALPRO / OBLUM / PACTIL / IGE/ SKIPPER SEIL
31	HV POTTENTIAL TRANSFORMER/(PT)	ABB / BHEL / CAPPA /JYPTI / SKIPPER SEIL
32.	HV CURRENT TRANSFORMER/ (CT)	ABB / BHEL / CAPPA /JYPTI / SKIPPER SEIL
33.	HIGH VOLTAGE DOUBLE BRAKE ISOLATOR WITH OR WITHOUT EARTH BRAKE	ATLAS / ABB / ELPRO / PRACTIL / SKIPPER SEIL
34.	VACCUM CIRCUIT BRAKER	ABB / BHEL / CGL / SCHNEIDER / JYPTI/
35.	33/6.6 KV POWER TRANSFORMER	ABB / CGL / ALSTOM / BHARAT BIJLEE / KIRLOSKAR / UTTAM (BHARAT) / VOLTAMP / VARDHMAN ELECTRO – MECH /SKIPPER
36.	33 OR 6.6/ .433 KV AUXILIARY TRANSFORMER	ABB / CGL / ALSTOM / BHARAT BIJLEE / KIRLOSKAR / UTTAM (BHARAT) / VOLTAMP / VARDHMAN ELECTRO – MECH/SKIPPER
37.	33KV SWITCHYARD CONTROL PANEL	GEC / L&T / SIEMENS / SCHNEIDER
38.	INDICATING METERS	AE / IMP / RISHAB/ E&H
39.	METERING	AE / IMP / RISHAB/ E&H
40.	ANNUCIATOR	MASIBUS / LETROTEK / APLAB / MINILEC / PEACON / ICA
41.	HT SWITCH GEAR PANEL	SCHNEIDER / ABB / SIEMENS / L&T/ C&S / CGL/ HT SWITCHGEARS/ SWATI SWITCHGEARS
42.	HRC FUSES	L&T / GEC / SIEMENS / ER / HAVELLS
43.	PROTECTION RELAYS	SCHNEIDER / ABB / SIEMENS / GEC / ER
44.	MOTOR PROTECTION RELAY	SCHNEIDER / ABB / SIEMENS / GEC/ ER
45.	PUSH BUTTON	L&T / BCH / SIEMENS / VAISHNO / TECHNIC / RASS / C&S
46.	INDICATING LAMPS	L&T / BCH / SIEMENS / VAISHNO / TECHNIC / RASS / C&S/MILLBURN
47.	MULTI FUNCTION METERS	GEC / IMP/ SIEMENS / RISHAB / AE
48.	CURRENT TRANSFORMERS	ABB / BHEL / KAPPA / JYOTI / SKIPPER SEIL
49.	POTTENTIAL TRANSFORMERS	ABB/ BHEL/ KAPPA / JYOTI / SKIPPER SEIL

50.	LT SWITCH GEAR PANEL	GEC / CGL / SCHNEIDER / L&T / C&S / SIEMENS / HAVELLS/ DYNAMIC / GK MARKETING / DIVYA/ HT SWITCHGEARS/ SWATI SWITCHGEARS / ENGINEERS & ENGINEERS/Millburm
51.	MOULDED CASE CIRCUIT BREAKER	GEC / CG L/ SCHNEIDER / L&T/ C&S / SIEMENS / HAVELLS / ABB
52.	TOR SWITCH	L&T / KAYEES / SCHNEIDER / SIEMENS / SALZER
53.	CONTROL FUSES	GEC / SCHNEIDER / L&T / C&S / SIEMENS / HAVELLS
54.	CONTACTORS	GEC / ABB / L&T / C&S / SIEMENS / BCH / HAVELLS / DIVYA
55.	EMERGENCY DG SYSTEM ENGINE	KIRLOSKAR / KIRLOSKAR-CUMMINS / GREAVES COTTON / CATER PILLAR / ASHOKA LEYLAND
56.	ALTERNATOR	KEC / JYOTI / NGEF / AVK / CROMPTON
57.	INDUCTION MOTOR	KEC/ NGEF/ CGL/ GEC/ BHEL/ SIEMENS / SCHNEIDER
58.	HT CABLE	CCI / INCAB / UNISTAR / RPG / NICCO / FORT GLOSTAR / SATELLITE / HAVELLS / KEI
59.	CONTROL CABLE	CCI / UNIVERSAL / TORRENT/ FINOFLEX / GEMSCAB / RPG / KEI / CORDS
60.	BATTERY CHARGER	SABNIFE POWER SYSTEM / CHHABIELECT/ UPTRON / AMCO / UNIVERSAL
61.	CAPACITOR	GEC / L&T/ YASH/ MADHAV / RPG / KHATAU JANKAR / UNISTAR
62.	PVC LIGHTING WIRES	FINOLEX / INCAB / RPG / FORT GLOSTER / GEMSCAB / KEI
63.	LIGHTING FIXTURES	PHILIPS / CGI / BAJAJ / MYSORE LAMPS / GE APAR / HAVELLS
64.	ELECTROMAGNETIC FULL BORE TYPE FLOW METER	FISHER ROSE MOUNT / KROHNE MARSHALL / NIVO CONTROL / E&H / SIEMENS / RLT / SBEM / ABB/ ELECTRONET
65.	ULTRA SONIC TYPE FLOW METER	FISHER ROSE MOUNT / E&H / KROHNE MARSHALL / SIEMENS / NIVO CONTROL / CHETAS / RLT
66.	MECHANICAL TURBINE TYPE FLOW METER	KENT / ITRON / CAPSTAN / NIVO CONTROL / AQUAMET / RLT
67.	PRESSURE LOGGERS	L&T / ABB / MASIBUS / LETROTEK
68.	PRESSURE GAUGE	BELLS CONTROLS/ JN MARSHAL / H GURU / MANOMETER INDIA
69.	PRESSURE INDICATOR	FISHER ROSE MOUNT/ BELLS CONTROLS / HONEYWELL / FOX BORO / E&H/ RLT
70.	PRESSURE TRANSMITER	FISHER ROSE MOUNT/ HONEY WELL / FOX BORO / BDO FORBES MARSHAL/ YOKO GAWA / BLUE STAR SEIMENS/ E&H / RLT
71.	LEVEL SWITCH	FISHER ROSE MOUNT / HONEY WELL / SIEMENS / VEGA INSTRUMENT / KROHNE MARSHALL/ SBEM/ E&H / RLT
72.	LEVEL SENSORS (ULTRA SONIC TYPE)	FISHER ROSE MOUNT / HONEY WELL / VEGA INSTRUMENT/ KROHNE MARSHALL / SIEMENS / SBEM / E&H / RLT
73.	LEVEL SENSORS (CAPACITANCE TYPE)	LEVCON / TOSHNIWAL / PUNE TECHTROL/ SBEM / E&H / RLT

74.	LEVEL TRANSMITTER	FISHER ROSE MOUNT / HONEY WELL / VEGA INSTRUMENT / KROHNE MARSHALL / SIEMENS / SBEM / E&H / RLT
75.	LEVEL INDICATOR	FORBES MARSHAL / YOKO GAWA / BLUE STAR / ELECTRO LUX / BELLS CONTROLS/ SBEM / E&H / RLT
76.	NOISE METER	CYGNET
77.	VT PUMPS	FLOWMORE / M&P / KBL / WPIL / JYOTI / AQUA
78.	HSCF PUMPS	FLOWMORE / M&P / KBL / WPIL /JYOTI / BEACONWEIR / LUBI (UPTO 45 KW) / MAXFLOW (UPTO 45KW)
79.	TAPE COATING ON MS PIPE	LLOYD INSULATION/ IWL / BITU-TECH / TYCO
80.	ZVV	SURESEAL / MANNEMANN MEER / MEGHA ENGINEERING / FLOWNIX
81.	PLC SCADA	ABB / ALLEN BRADLY / HONEY WELL / SCHENIDGER / L&T / SIEMENS/ E&H/GE /PHOENIX CONTACT
82.	SUBMERSIBLE CENTRIFUGAL PUMP	AQUA

SECRETARY,
RWSSMB, JAIPUR

SPECIFICATIONS

SPECIFICATIONS FOR CIVIL WORKS

Civil and Building Works

1.1 General

This part of the specification covers the specifications of material and workmanship for the civil works. Material used and workmanship for the civil works of pump house, campus development, repair/new works of pumping station, renovation of buildings, civil works associated with pipeline laying etc. to be done under the contract will adhere to the provisions laid down in this chapter.

For materials used other than those specified, the material must conform to the requirement of respective Indian Standards. The contractor shall get prior approval of the materials proposed to be used under the contract as per the provisions of Special Conditions of Contract, from the Engineer-in-Charge.

1.2 Requirements for Construction of RCC Reservoirs

1.2.1 General

The RCC reservoirs are to be constructed as per the type; & size detailed in the "Scope of Work" defined in this Volume II of tender document. The CWR shall is circular in plan.

1.2.2 Preparatory Works

The Contractor shall provide and maintain a benchmark with a level at a location approved by the Engineer in Charge at each reservoir construction sites. All levels shall be deemed to refer to that benchmark. The Contractor may establish other secondary benchmarks on the site.

1.2.3 Soil & Geo Technical Investigation

SBC tests shall be got done through an approved agency wherever the strata on which foundation is to be laid is not rocky. For foundations to be laid on sandy strata, the structural design and reinforcement drawings shall be prepared assuming maximum SBC of soil as 7.5 T/Sqm even if the SBC testing is found to be 7.5 T/Sqm or more at foundation depth. If the SBC testing is found to be less than 7.5 T/Sqm at foundation depth, the structure shall be designed on the basis of actual SBC found on testing for which no extra payment will be made to contractor.

1.2.4 Material of Construction

The building material to be used shall be as per the specifications given in this chapter. The pipes & specials to be used shall be as per the specifications given in this volume. The valves, instruments, etc. shall be as per the specifications given in this volume II respectively containing specifications of Valves and Instrumentation.

1.2.5 Concrete Grade, cover, minimum cement content and thickness

Grade of concrete to be used for the reservoirs shall be as per the provisions of IS 456:2000 (with latest amendments) for moderate environmental exposure conditions. The minimum cement content for reservoir members shall be 360 Kg/cum. For other works such as plinth protection etc., the minimum cement content shall be as per the respective codes. Minimum cover as prescribed in IS 456 shall be provided. The minimum thickness of reservoir members shall be in accordance to the provisions of IS 456 and IS 3370. The work of RCC structures shall be in accordance to departmental drawings attached in Volume III.

1.2.6 Final Finishing

The contractor will ensure that the entire structure along with all its installations are in a finished and in new and fully operative condition when handed over, after the O & M period is over. He shall have repaired and removed all signs of damage that might have been done during the course of installation and fixing of equipment. He shall also see that all the exterior has been finished properly and the entire site is cleared of all extra construction material, debris and excavated soil. This shall have to be done to the satisfaction of the Engineer in Charge.

1.3 Miscellaneous Items of Reservoirs

1.3.1 Puddle collars

Puddle collars shall be used for connecting the inlet, outlet, overflow & washout pipes to the reservoir. All puddles shall be fixed at right angle to the RCC wall during casting of wall. All puddle collars shall be of C.I. The minimum length shall be at least 100 mm more than the total finished thickness of the walls and size of the puddle collars shall be equal to the size of the outlet pipe.

1.3.2 Ladder

The ladders in reservoirs shall be of structural steel as mentioned in the drawing in Volume III. Its drawing shall be got approved from EIC before dispatch.

1.3.3 Ventilator

Ventilators shall be provided for all reservoirs as mentioned in the drawing of CWR in Volume III.

1.3.4 Man Hole Cover

Square manhole cover 600X600 mm shall be provided. The cover shall be made of 3 mm thick MS flat. The frame shall be made of MS angle 50*50*6. The cover shall be connected to this frame by using two nos. strung hinges. Locking arrangement shall be provided.

1.3.5 Water Bar

Water bar of G.I. sheet 150 mm wide 20 gauge shall be provided as per IS 3370 Part-I 2009 as construction joints in vertical wall. Overlaps in sheets shall be 150 mm. PVC water stopper of approved specifications may also be used after approval of EIC.

1.4 Testing for water tightness

The contractor shall carry out a water tightness test as per IS;3370 for the maximum water head condition i.e. with the water standing at full supply level. All cost of testing shall be borne by the contractor. This test shall be carried out in accordance with the procedure given below

- For water tightness test, before the filling operations are started, the reservoirs shall be jointly inspected by the Engineer in Charge and the representative of the Contractor and condition of surfaces of wall, construction joints etc. shall be inspected and noted and it shall be ensured that jointing material filled in the joints is in position and all openings are closed. The contractor shall make necessary arrangement for ventilation and lighting of reservoir by way of flood lights, circulators etc. for carrying out proper inspection of surfaces and internal conditions if so desired by the Engineer in Charge.
- The water retaining structures shall be filled with water gradually at the rate not exceeding 30 cm. rise in water level per hour and shall extend for a period of 72 hours. Records of leakages starting at different level of water in the reservoirs, if any, shall be kept.
- The reservoirs once filled shall be allowed to remain filled for a period of 7 days before any readings or drop in water level is recorded again at 7 days. The total drop in surface level over a period of 7 days shall be taken as indication of the water tightness of the reservoir, which for all practical purposes shall not exceed 40mm. There shall be no indication of leakages around the puddle collars or on the wall and bottom of the reservoir.
- If the structure does not satisfy the test requirements, and the daily drop in water level is decreasing, the period of test may be extended for further seven days and if the specified limit is not exceeded, the structure may be considered as satisfactory.
- In case the drop in water level exceeds the permissible limit with the stipulated period of test, the Contractor shall carry out such additional works and adopt such measures as may be directed by the Engineer in charge to reduce the leakage in the permissible limit. The entire rectification work that shall be carried out in this connection shall be at Contractor's cost.

If the test results are unsatisfactory, the Contractor shall ascertain the cause and make all necessary repairs and repeat the water retaining structures test procedures, at his own cost. Should the re-test results still be unsatisfactory after the repairs, the structure will be condemned and the Contractor will dismantle and reconstruct the structure, to the original specification, at his own cost.

1.5 Materials & Standards

The term "materials" shall mean all materials, goods and articles of every kind whether raw, processed or manufactured and equipment and plant of every kind to be supplied by the Contractor for incorporation in the Works.

Where the relevant standard provides for the furnishing of a certificate to the Engineer-in-charge, at his request, stating that the materials supplied comply in all respects with the standard, the Contractor shall obtain the certificates and forward it to the Engineer-in-charge.

The specifications, standards and codes listed below are considered to be part of this Bid specification. All standards, specifications, codes of practices referred to herein shall be the latest editions including all applicable official amendments and revisions.

In case of discrepancy between two standards the provisions more stringent shall be followed. In case of discrepancy between the Bid Specification and the Standards referred to herein, the Bid Specification shall govern.

IS No.	Title
CONSTRUCTION PLANNING AND STORAGE OF MATERIALS	
4082 :	Recommendation on stacking and storage of construction materials at site (first revision)
7969 :	Safety code for handling and storage of building materials
EARTHWORK	
883 :	Design of structural timber in building - Code of practice (third revision)
1498	Classification and identification of soils for general engineering purposes (first revision) (Amendments 2) (Reaffirmed)
2682 : 1984	Chlordane emulsifiable concentrates (second revision) (Amendment 1) (Reaffirmed 1994)
3764: 1992	Excavation work - Code of safety (first revision)
4081	Safety code for blasting and related drilling operations
6313 (Part 2)	Code of practice for anti-termite measures in buildings : Part 2 Preconstructional chemical treatment measures (Reaffirmed)
FOUNDATIONS	
269 :	33 grade ordinary Portland cement.
432 (Part 1)	Mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement : Part 1 Mild steel and medium tensile steel bars (third revision)
456-2000	Code of practice for plain and reinforced concrete
1080 : 1986	Code of practice for design and construction of shallow foundations on soils (other than raft, ring and shell)
1489 (Part 1)	Portland pozzolana cement : Part 1 Fly ash based
1489 (Part 2)	Portland pozzolana cement : Part 2 Calcined clay based
1786	High strength deformed steel bars and wires for concrete reinforcement
1904	Code of practice for design and construction of foundations in soils : General requirements
2062	Steel for general structural purposes
2950 (Part 1)	Code of practice for design and construction of raft foundations : Part 1 Design
2974 (Part 1)	Code of practice for design and construction of machine foundations : Part 1 Foundations for reciprocating type machines
2974 (Part 2)	Code of practice for design and construction of machine foundations : Part 2 Foundations for impact type machines (hammer foundations)
2974 (Part 3)	Design and construction of machine foundations - Code of practice : Part 3 Foundations for rotary type machines (medium and high frequency)
2974 (Part 4)	Code of practice for design and construction of machine foundations : Part 4 Foundations for rotary type machines of low frequency
2974 (Part 5)	Code of practice for design and construction of machine foundations : Part 5 Foundation for impact machines other than hammers (forging and stamping press, pig breakers, drop crusher and jolter)
3629	Specification for structural timber in building (first revision) (Reaffirmed 1991)
4091 : 1979	Code of practice for design and construction of foundations for transmission line towers and poles (first revision) (Reaffirmed 1987)
6403	Code of practice for determination of bearing capacity of shallow foundations.
6909	Specification for supersulphated cement
8009 (Part 1)	Code of practice for calculation of settlement of foundations : Part 1 Shallow foundations subject to symmetrical static vertical loads
8009 (Part 2)	Code of practice for calculation of settlement of foundations : Part 2 Deep foundations subjected to symmetrical static vertical loading.
4138	Safety code for working in compressed air.
8041	Rapid hardening Portland cement
9456 : 1980	Code of practice for design and construction of conical and hyperbolic paraboloidal types of shell foundations.

19556	Code of practice for design and construction of diaphragm walls.
11089	Code of practice for design and construction of ring foundation
12269	53 grade ordinary Portland cement.
13094	Guidelines for selection of ground improvement techniques for foundation in weak soils.
13301	Guidelines for vibration isolation for machine foundations
SP 36 (Part 2) : 1988	Compendium of Indian Standards on soil engineering : Part 2 Field testing

MASONRY

Part 1 Mortars

269	33 grade ordinary Portland cement
383	Coarse and fine aggregates from natural sources for concrete
456-2000	Code of practice for plain and reinforced concrete
1344	Calcined clay pozzolana
1489 (Part 1)	Portland pozzolana cement : Part 1 Fly ash based
1489 (Part 2)	Portland pozzolana cement : Part 2 Calcined clay based
2116	Stand for masonry mortars
2250	Code of practice for preparation and use of masonry mortars
2720 (Parts 1 to 41)	Methods of test for soils
3812	Fly ash for use as pozzolana and admixture
6452	Specification for high alumina cement for structural use
6909	Specification for supersulphated cement
8041	Rapid hardening Portland cement
8043	Hydrophobic Portland cement
8112	43 grade ordinary Portland cement
12269	53 grade ordinary Portland cement
12600	Low heat Portland cement
SP 20 (S &T) :	Handbook on masonry design and construction
SP 21 (S &T)	Summaries of Indian Standards for building materials

Part 2 Brickwork

269	33 grade ordinary Portland cement
383	Coarse and fine aggregates from natural sources for concrete
455	Portland slag cement
456	Code of practice for plain and reinforced concrete
1489 (Part 1)	Portland pozzolana cement : Part 1 Fly ash based
1489 (Part 2)	Portland pozzolana cement : Part 2 Calcined clay based
2645	Integral cement waterproofing compounds
3812	Fly ash for use as pozzolana and admixture
5454	Methods of sampling of clay building bricks
6452	Specification for high alumina cement for structural use
4014 Part 1 & 2	Code of practice for steel tubular scaffolding
6909	Specification for supersulphated cement
8041	Rapid hardening Portland cement
8042	White Portland cement
8043	Hydrophobic Portland cement
8112	43 grade ordinary Portland cement
9103	Admixture for concrete
12269	53 grade ordinary Portland cement
12600	Low heat Portland cement
SP 20 (S &T) :	Handbook on masonry design and construction
SP 21 (S &T)	Summaries of Indian Standards for building materials
1077	Common burnt clay building bricks
2212	Code of practice for brick work
3696 (Part 1)	Safety code of scaffolds and ladders : Part 1 Scaffolds

4014 (Part 2)	Code of practice for steel tabular scaffolding : Part 2 Safety regulations for scaffolding
SP 25 (S & T)	Handbook on caused and prevention of cracks in building
Stonework	
1123	Method of identification of natural building stones
1127	Recommendations for dimensions and workmanship of natural building stones for masonry work
1128	Limestone (slab and tiles)
1129	Recommendation for dressing of natural building stones
1130	Marble (blocks, slabs and tiles)
1597 (Part 1)	Code of practice for construction of stone masonry : Part 1 Rubble stone masonry
1597 (Part 2)	Code of practice for construction of stone masonry : Part 2 Ashlar masonry
1905	Code of practice for structural use of un-reinforced masonry
2250	Code of practice for preparation and use of masonry mortars
3316	Specification for structural granite
3622	Specification for sandstone (slab and tiles)
3696 (Part 1)	Safety code of scaffolds and ladders : Part 1 Scaffolds
4101 (Part 1)	Code of practice for external facing and veneers : Part 1 Stone facing
12440	Pre-cast concrete stone masonry blocks
SP 20 (S & T)	Handbook on masonry design and construction
SP 21 (S & T)	Summary of Indian Standards for building materials
PLAIN AND REINFORCED CONCRETE	
269	33 grade ordinary Portland cement
383	Coarse and fine aggregates from natural resources for concrete
432 (Part 1 & 2)	Mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement: Part 1 Mild steel and medium tensile steel bars. Part 2 Hard drawn steel wire
455	Portland slag cement
456	Code of practice for plain and reinforced concrete
516	Method of test for strength of concrete
712	Building limes
875 (Part 1)	Code of practice for design loads (other than earthquake) for buildings and structures : Part 1 Dead loads -Unit weights of building material and stored materials
875 (Part 2)	Code of practice for design loads (other than earthquake) for buildings and structures : Part 2 Imposed loads
875 (Part 3)	Code of practice for design loads (other than earthquake) for buildings and structures : Part 3 Wind loads
875 (Part 4)	Code of practice for design loads (other than earthquake) for buildings and structures : Part 4 Snow loads
875 (Part 5)	Code of practice for design loads (other than earthquake) for buildings and structures : Part 5 Special loads and load combinations
650	Standard sand for testing of cement
3085	Method of test for permeability of cement mortar & concrete
9284	Method of test for abrasion resistance of concrete
5816	Method of test for splitting tensile strength of concrete cylinders
8142	Method of test for determining setting time of concrete by penetration resistance
12600	Low heat Portland cement masonry cement
3466	Masonry cement
3558	Code of practice immersion Vibrator for consolidating concrete
8042	White Portland cement
13620	Fusion bonded epoxy coated reinforcing bars
1343	Code of practice for Prestressed concrete
883	Design of structural timber in building - Code of practice
1199	Methods of sampling and analysis of concrete
1344	Calcined clay pozzolana
1489 (Part 1)	Portland pozzolana cement : Part 1 Fly ash based
1489 (Part 2)	Portland pozzolana cement : Part 2 Calcined clay based

1566	Hard-drawn steel wire fabric for concrete reinforcement
1786	High strength deformed steel bars and wires for concrete reinforcement
1791	Batch type concrete mixers
1946	Code of practice for use of fixing devices in walls, ceilings and floors of solid construction
2062	Steel and general structural purposes
2386 (Part 1)	Methods of test for aggregates for concrete : Part 1 Particle size and shape
2386 (Part 2)	Methods of test for aggregates for concrete : Part 2 Estimation of deleterious materials and organic impurities
2386 (Part 3)	Methods of test for aggregates for concrete : Part 3 Specific gravity, density, voids, absorption and bulking
2386 (Part 4)	Methods of test for aggregates for concrete : Part 4 Mechanical properties
2386 (Part 5)	Methods of test for aggregates for concrete : Part 5 Soundness
2386 (Part 6)	Methods of test for aggregates for concrete : Part 6 Measuring mortar making properties of fine aggregates
2386 (Part 7)	Methods of test for aggregates for concrete : Part 7 Alkali aggregate reactivity
2386 (Part 8)	Methods of test for aggregates for concrete : Part 8 Petrographic examination
2502	Code of practice for bending and fixing of bars for concrete reinforcement
2505	Concrete vibrators - Immersion type - General requirements
2506	General requirements for screed board concrete vibrators
2514	Concrete vibrating tables
2751	Recommended practice for welding of mild steel plain and deformed bars for reinforced construction
3025	Methods of sampling and test (physical and chemical) for water used in industry
3036	Laying lime concrete for a waterproofed roof finish - Code of practice
3812	Fly ash for use as pozzolana and admixture
4031 (Part 1)	Methods of physical tests for hydraulic cement : Part 1 Determination of fineness by dry sieving
4098	Lime-pozzolana mixture (first revision)
4656	Form vibrators for concrete
4925	Concrete batching and mixing plant
4926	Ready mixed concrete
4990	Plywood for concrete shuttering work
6452	Specification for high alumina cement for structural use
6909	Specification for supersulphated cement
7861 (Part 1)	Code of practice for extreme weather concreting : Part 1 Recommended practice for hot weather concreting
7861 (Part 2)	Code of practice for extreme weather concreting : Part 2 Recommended practice for cold weather concreting
8041	Rapid hardening Portland cement
8043	Hydrophobic Portland cement
8112	43 grade ordinary Portland cement
9012	Recommended practice for Concreting
9013	Method of making, curing and determining compressive strength of accelerated cured concrete test specimens
9103	Admixtures for concrete
10262	Recommended guidelines for concrete mix design
12269	53 Grade ordinary Portland Cement
13330	Sulphate resisting Portland Cement
12600	Low heat Portland cement
13311 (Part 1)	Non-destructive testing of concrete - Methods of test : Part 1 Ultrasonic pulse velocity
13311 (Part 2)	Non-destructive testing of concrete - Methods of test : Part 2 Rebound hammer
SP 23 (S & T)	Handbook on concrete mixes (based on Indian Standards)
SP 24 (S & T)	Explanatory handbook on Indian Standard Code for plain and reinforced concrete
SP 33 (S & T)	Handbook on timber engineering
SP 34 (S & T)	Handbook on concrete reinforcement and detailing

ANTI-TERMITE MEASURES

6313 (Part 1)	Code of practice for anti-termite measures in buildings : Part 1 Constructional measures
6313 (Part 2)	Code of practice for anti-termite measures in buildings : Part 2 Pre-constructional chemical treatment measures(first revision)(Amendments 3)

DOOR AND WINDOWS (WOOD AND METAL)

208	Door handles
303	Plywood for general purposes
399	Classification of commercial timbers and their zonal distribution
401	Code of practice for preservation of timber
419	Putty, for use on window frames
1003 (Part 1)	Timber panelled and glazed shutters : Part 1 Door shutters
1003 (Part 2)	Timber panelled and glazed shutters : Part 2 Window and ventilator shutters
1038	Steel doors, windows and ventilators
1081	Code of practice for fixing and glazing of metal (steel and aluminium) doors, windows and ventilators
1328	Veneered decorative plywood
1658	Fibre hardboards
1659	Block boards
2191 (Part 1)	Wooden flush door shutters (cellular and hollow core type) : Part 1 Plywood face panels
2191 (Part 2)	Wooden flush door shutters (cellular and hollow core type) : Part 2 Particle board and hard board face panels
2202 (Part 1)	Wooden flush door shutters (solid core type) : Part 1 Plywood face panels
2202 (Part 2)	Wooden flush door shutters (solid core type) : Part 2 Particle board and hard board face panels
2553 (Part 1)	Safety glass : Part 1 General purpose
2835	Flat transparent sheet glass
3087	Wood particle boards (medium density) for general purposes
3097	Veneered particle boards
3129	Low density particle boards
3348	Specification for Fibre insulation boards
3478	Specification for high density wood particle boards
3548	Code of practice for glazing in building
10521	Collapsible gates
6248	Metal rolling shutters & grills
10451	Steel sliding shutters
1361	Steel windows for industrial buildings, ventilation blinds for windows
4021	Timber door, window and ventilator frames
1826	Venation blinds for windows
1948	Aluminum doors, windows and ventilators
4020 (Parts 1-16)	Door shutters, method of test
4351	Specification for steel door frames
4913	Code of practice for selection, installation and maintenance of timber doors and windows
4962	Specification for wooden side sliding doors
5187	Flush bolts
5437	Figured, rolled and wired glass
5509	Fire retardant plywood
5539	Specification for preservative treated plywood
6198	Legged, braced and battened timber door shutters
6248	Specification for metal rolling shutters and rolling grills
6534	Guiding principles of grading and inspection of timber
6701	Tungsten filament miscellaneous electric lamps
7316	Decorative plywood using plurality of veneers for decorative faces
7452	Hot-rolled steel sections for doors, windows and ventilators

10439	Code of practice for patent glazing
10451	Steel sliding shutters
10521	Collapsible gates
10701	Structural plywood
11433 (Part 1)	One part grade polysulphide base joints sealant : Part 1 General requirements
11433 (Part 2)	One part grade polysulphide base joints sealant : Part 2 Methods of test
12896	Classification of Indian timbers for door and window shutters and frames
SP 21 (S & T)	Summarise of Indian Standards for building materials
SP 33 (S & T)	Handbook on timber engineering

STEEL CONSTRUCTION

104	Ready mixed paint, brushing, zinc chrome, priming
123	Ready mixed paint, brushing, finishing, semi-gloss, for general purposes to Indian Standard Colours No.445, 446, 448, 449, 451, 473 and red oxide
800	Code of practice for general construction in steel
801	Code of practice for use of cold formed light gauge steel structural members in general building construction.
806	Code of practice use of steel tubes in general building construction
811	Cold formed light gauge structural steel sections
814	Covered electrodes for manual metal arc welding of carbon and carbon manganese steel
816	Code of practice for use of metal arc welding for general construction in mild steel
817 (Part 1)	Code of practice for training and testing of metal arc welders : Part 1 Manual metal arc welding
819	Code of practice for resistance spot welding for light assemblies in mild steel
919 (Part 1)	ISO system of limits and fits : Part 1 Bases of tolerances, deviations and fits
1024	Code of practice for use of welding in bridges and structures subject to dynamic loading
1030	Carbon steel castings for general engineering purposes
1148	Hot-rolled rivet bars (up to 40 mm dia) for structural purposes
1149	High tensile steel rivet bars for structural purposes
1161	Steel tubes for structural purposes
1182	Recommended practice for radiographic examination of fusion welded butt joints in steel plates
1261	Code of practice for seam welding in mild steel
4000	Code of practice for high strength bolts in steel construction
1852	Rolling and cutting laterals for list rolled steel structures
1278	Filler rods and wires for gas welding
1323	Code of practice for oxy-acetylene welding for structural work in mild steels
1363 (Part 1)	Hexagon head bolts, screws and nuts of product grade C : Part 1 Hexagon head bolts (size range M 5 to M 64)
1363 (Part 2)	Hexagon head bolts, screws and nuts of product grade C : Part 2 Hexagon head screws (size range M 5 to M 64)
1363 (Part 3)	Hexagon head bolts, screws and nuts of product grade C : Part 3 Hexagon nuts (size range M 5 to M 64)
1364 (Part 1)	Hexagon head bolts, screws and nuts of product grades A and B : Part 1 Hexagon head bolts (size range M 1.6 to M 64)
1364 (Part 2)	Hexagon head bolts, screws and nuts of product grades A and B : Part 2 Hexagon head screws (size range M 1.6 to M 64)
1364 (Part 3)	Hexagon head bolts, screws and nuts of product grades A and B : Part 3 Hexagon nuts (size range M 1.6 to M 64)
1367 (Part 3)	Fasteners – Threaded steel - Technical supply conditions : Part 3 Mechanical properties and test methods for bolts, screws and studs with full loadability
1393	Code of practice for training and testing of oxy acetylene welders
1477 (Part 1)	Code of practice for painting of ferrous metals in buildings : Part 1 Pretreatment
1477 (Part 2)	Code of practice for painting of ferrous metals in buildings : Part 2 Painting
1929	Hot forged steel rivets for hot closing (12 to 36 mm diameter)
808	Dimensions for hot rolled steel beams, column channels and angle sections

1398	Placing paper, water proof, bitumen laminated
4353	Recommendations for submerged arc welding of mild steel and low alloy steel
2595	Code of practice for radiographic testing
3935	Code of practice for composite constructions
3658	Code of practice for liquid penetration flow detention
1977	Structural steel (ordinary quality)
2062	Steel for general structural purposes
2074	Ready mixed paint, air drying, red oxide-zinc chrome, priming
2155	Cold forged solid steel rivets for hot closing (6 to 16 mm diameter)
3502	Steel chequered plates
3613	Acceptance tests for wire flux combination for submerged are welding
3640	Hexagon fit bolts
3757	High strength structural bolts
5369	General requirements for plain washers and lock washers
5370	Plain washers with outside diameter ≈3 x inside diameter
5374	Taper washers for I-beams (ISMB)
6419	Welding rods and bare electrodes for gas shielded arc welding of structural steel
6560	Molybdenum and chromium-molybdenum low alloy steel welding rods and bare electrodes for gas shielded arc welding
6610	Heavy washers for steel structures
6623	High strength structural nuts
6649	Hardened and tempered washers for high strength structural bolts and nuts
7205	Safety code for erection of structural steel work
7215	Tolerances for fabrication of steel structures
7280	Bare wire electrodes for submerged arc welding of structural steels
7307 (Part 1)	Approval tests for welding procedures : Part 1 Fusion welding of steel
7310 (Part 1)	Approval tests for welders working to approved welding procedures : Part 1 Fusion welding of steel
7318 (Part 1)	Approval tests for welders when welding procedure approval is not required : Part 1 Fusion welding of steel
8500	Structural steel - Microalloyed (medium and high strength qualities)
9595	Recommendations for metal arc welding of carbon and carbon manganese steel
12843	Tolerances for erection of steel structures
5334	Code of practice for magnetic practice flow detention of welds
SP 6(5)	Cold- formed, light-gauge steel structures

FLOORS AND FLOOR COVERINGS

77	Linseed oil, boiled for paints
269	33 grade ordinary Portland cement
303	Plywood for general purposes
383	Coarse and fine aggregates from natural sources for concrete
401	Code of practice for preservation of timber
455	Portland stag cement
456	Code of practice for plain and reinforced concrete
533	Gum spirit of turpentine (oil of turpentine)
651	Salt glazed stoneware pipes and fittings
653	Linoleum sheets and tiles
657	Materials for use in the manufacture of magnesium oxychloride flooring compositions
658	Code of practice for magnesium oxychloride composition floors
712	Building limes
723	Steel countersunk head wire nails
809	Rubber flooring materials for general purposes
1077	Common burnt clay building bricks
1195	Bitumen mastic for flooring
1196	Code of practice for laying bitumen mastic flooring
1197	Code of practice for laying of rubber floors
1198	Code of practice for laying, fixing and maintenance of linoleum floor

1237	Cement concrete flooring tiles
1322	Bitumen felts for waterproofing and damp-proofing
1443	Code of practice for laying and finishing of cement concrete flooring tiles
1489 (Part 1)	Portland pozzolana cement : Part 1 Fly ash based
1489 (Part 2)	Portland pozzolana cement : Part 2 Calcined clay based
1580	Bituminous compounds for water proofing and caulking purposes
1609	Code of practice for laying damp-proofing treatment using bitumen felts
1661	Code of practice for application of cement and cement-lime plaster finishes
2114	Code of practice for laying in-situ terrazzo floor finish
2116	Sand for masonry mortars
2180	Heavy duty burnt clay building bricks
2386 (Part 4)	Methods of test for aggregates for concrete : Part 4 Mechanical properties
2571	Code of practice for laying in-situ cement concrete flooring
3384	Specification for bitumen primer for use in waterproofing and damp proofing
3414	Code of practice for design and installation of joints in buildings
3461	Specification for PVC - asbestos floor tiles
3462	Specification for unbacked flexible PVC flooring
3502	Steel Chequered plates
3583	Specification of burnt clay paving bricks
3622	Specification for sandstone (slabs and tiles)
3629	Specification for structural timber in building
3670	Code of practice for construction of timber floors
4441	Code of practice for use of silicate type chemical resistant mortars
4442	Code of practice for use of sulphur type chemical resistant mortars
4443	Code of practice for use of resin type chemical resistant mortars
4456 (Part 1)	Methods of test for chemical resistant mortars - Part 1 Silicate type and resin type
4456 (Part 2)	Methods of test for chemical resistant mortars - Part 2 Sulphur type
4457	Ceramic unglazed vitreous acid resisting tile
4631	Code of practice for laying of epoxy resin floor toppings
4832 (Part 1)	Specification for chemical resistant mortars : Part 1 Silicate type
4832 (Part 2)	Specification for chemical resistant mortars : Part 2 Resin type
4832 (Part 3)	Specification for chemical resistant mortars : Part 3 Sulphur type
4860	Acid resistant bricks
4971	Recommendations for selection of industrial floor finishes
5318	Code of practice for laying of flexible PVC sheet and tile flooring
5389	Code of practice for laying of hardwood parquet and wood block floors
5491	Code of practice for laying of in-situ granolithic concrete flooring topping
5760	Compressed argon
5766	Code of practice for laying of burnt clays brick flooring
6909	Specification for supersulphated cement
7193	Glass fibre base coaltar pitch and bitumen felts
8042	White Portland cement
8374	Bitumen mastic, anti-static and electrically conducting grade
9077	Code of practice for corrosion protection of steel reinforcement in RB and RCC construction
9197	Epoxy resin, hardness and epoxy resin compositions for floor toppings
9472	Code of practice for laying mosaic parquet flooring
10440	Code of practice for construction of RB and RBC floors and roofs

WALL AND CEILING FINISHES AND COVERINGS AND WALLING

269	33 grade ordinary Portland cement
303	Plywood for general purposes
383	Coarse and fine aggregates from natural sources for concrete
451	Technical supply conditions for wood screws
455	Portland slag cement
459	Corrugated and semi-corrugated asbestos cement sheets
710	Marine plywood
712	Building limes

723	Steel countersunk head wire nails
733	Wrought aluminium and aluminum alloy bars, rods and sections for general engineering purposes
737	Wrought aluminium and aluminum alloy sheet and strip for general engineering purposes
777	Glazed earthenware wall tiles
883	Design of structural timber in building - Code of Practice
1130	Marble (blocks, slabs and tiles)
1237	Cement concrete flooring tiles
1328	Veneered decorative plywood
1344	Calcined clay pozzolana
1414	Code of practice for fixing wall covering
1489 (Part 1)	Portland pozzolana cement : Part 1 Fly ash based
1489 (Part 2)	Portland pozzolana cement : Part 2 Calcined clay based
1542	Sand of plaster
1635	Code of practice for field slaking of building lime and preparation of putty
1658	Fibre hardboards
1659	Block boards
1661	Code of practice for application of cement and cement-lime plaster finishes
1946	Code of practice for use of fixing devices in walls, ceilings and floors of solid construction
2095	Gypsum plaster boards
2098	Asbestos cement building boards
2114	Code of practice for laying in-situ terrazo floor finish
2116	Sand for masonry mortar
2185 (Part 1)	Concrete masonry units : Part 1 Hollow and solid concrete blocks
2185 (Part 2)	Concrete masonry units : Part 2 Hollow and solid light weight concrete blocks
2185 (Part 3)	Concrete masonry units : Part 3 Autoclaved cellular aerated concrete blocks
2402	Code of practice for external rendered finishes
2441	Code of practice for fixing ceiling covering
2547 (Part 1)	Gypsum building plaster : Part 1 Excluding premixed lightweight plaster
2547 (Part 2)	Gypsum building plaster : Part 2 Premixed lightweight plaster
2691	Burnt clay facing bricks
2818	Indian hessian : Part 1 General
2849	Specification for non-load bearing gypsum partition blocks
3087	Wood particle boards (medium density) for general purposes
3097	Veneered particle boards
3129	Low density particle boards
3348	Specification for fibre insulation boards
3466	Specification for masonry cement
3478	Specification for high density wood particle boards
3629	Specification for structural timber in building
3630	Code of practice for construction of non-load bearing gypsum block partitions
3677	Unbonded rock and slag wool for thermal insulation
3812	Fly ash for use as pozzolana and admixture
4101 (Part 1)	Code of practice for external facing and veneers : Part 1 Stone facing
4101 (Part 2)	Code of practice for external facing and veneers : Part 2 Cement Concrete facing
4101 (Part 3)	Code of practice for external facing and veneers : Part 3 Wall tiling and mosaics
4407	Code of practice for reed walling
4671	Expanded polystyrene for thermal insulation purposes
5390	Code of practice for construction of timber ceiling
5509	Fire retardant plywood
6730	Felt nails
6738	Panel pins and lost head nails
6760	Slotted countersunk head wood screws
7316	Decorative plywood using plurality of veneers for decorative faces
8041	Rapid hardening Portland cement

12727	Code of practice for no fines cast in-situ cement concrete

ROOFS AND ROOFING

158	Ready mixed paint, brushing, bituminous, black lead-free, acid alkali and heat resisting
217	Cutback bitumen
269	33 grade ordinary Portland cement
277	Galvanized steel sheet (plain and corrugated)
280	Mild Steel wire for general engineering
383	Coarse and fine aggregates from natural sources for concrete
432 (Part 1)	Mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement : Part 1 Mild steel and medium tensile steel bars
451	Technical supply conditions for wood screws
455	Portland stag cement
456	Code of practice for plain and reinforced concrete
459	Corrugated and semi-corrugated asbestos cement sheets
723	Steel countersunk head wire nails
725	Copper wire nails
730	Hook bolts for corrugated sheet roofing
805	Code of practice for use of steel in gravity water tanks
808	Dimensions for hot-rolled steel beam, column channel and angle sections
883	Design of structural timber in building - Code of Practice
1077	Common burnt clay building bricks
1120	Coach screws
1199	Methods of sampling and analysis of concrete
1254	Corrugated aluminium sheet
1322	Bitumen felts for waterproofing and damp-proofing
1343	Code of practice for Prestressed concrete
1344	Calcined clay pozzolana
1489 (Part 1)	Portland pozzolana cement : Part 1 Fly ash based
1489 (Part 2)	Portland pozzolana cement : Part 2 Calcined clay based
2098	Asbestos cement building boards
2119	Code of practice for construction of brick-cum-concrete composite (Madras terrace) floor or roof
2204	Code of practice for construction of reinforced concrete shell roof
2527	Code of practice for fixing rainwater gutters and down pipes for roof drainage
2690 (Part 1)	Burnt clay flat terracing tiles : Part 1 Machine made
2690 (Part 2)	Burnt clay flat terracing tiles : Part 2 Hand made
3007 (Part 1)	Code of practice for laying of asbestos cement sheets : Part 1 Corrugated sheets
3007 (Part 2)	Code of practice for laying of asbestos cement sheets : Part 2 Semi-corrugated sheets
3629	Specification for structural timber in building
6061 (Part 1)	Code of practice for construction of floor and roof with joints and filler blocks : Part 1 with hollow concrete filler blocks
6061 (Part 2)	Code of practice for construction of floor and roof with joints and filler blocks : Part 2 with hollow clay filler blocks
6061 (Part 3)	Code of practice for construction of floor and roof with joints and filler blocks : Part 3 Precast hollow clay blocks joints and hollow clay filler blocks
6061 (Part 4)	Code of practice for construction of floor and roof with joints and filler blocks : Part 4 With precast hollow clay blocks slab panels
6332	Code of practice for construction of floor and roofs using precast doubly curved shell units
8869	Washers for corrugated sheet roofing
12093	Code of practice for laying and fixing of sloped roof coverings using plain and corrugated galvanized steel sheet (ISO 6589-1983)
12506	Code of practice for improved thatching of roof with rot and fire retardant treatment

DAMP - PROOFING AND WATERPROOFING

73	Paving bitumen
269	33 grade ordinary Portland cement
383	Coarse and fine aggregates from natural sources for concrete
702	Industrial bitumen
1195	Bitumen mastic for flooring
1203	Determination of penetration
1322	Bitumen felts for waterproofing and damp-proofing
1346	Code of practice for waterproofing of roofs with bitumen felts
1580	Bituminous compounds for water proofing and caulking purposes
1609	Code of practice for laying damp-proofing treatment using bitumen felts
1635	Code of practice for field slaking of building lime and preparation of putty
1834	Hot applied sealing compound for joint in concrete
2116	Sand for masonry mortars
2508	Low density polyethylene films
2527	Code of practice for fixing rainwater gutters and down pipes for roof drainage
2541	Code of practice for preparation and use of lime concrete
2645	Integral cement water proofing compounds
2690 (Part 1)	Burnt clay flat terracing tiles : Part 1 Machine made
2690 (Part 2)	Burnt clay flat terracing tiles : Part 2 Hand made
3036:1992	Laying lime concrete for a waterproofed roof finish
3037	Bitumen mastic for use in waterproofing of roofs
3067	Code of practice for general design details and preparatory work for damp-proofing and waterproofing of buildings
3370 (Part 1)	Code of practice for concrete structures for the storage of liquids : Part 1 General Requirements
3384	Specification for bitumen primer for use in waterproofing and damp proofing
4098	Lime-pozzolana mixture
4365	Code of practice for application of bitumen mastic for water proofing of roofs
5871	Bitumen mastic for tanking and damp-proofing
6494	Code of practice for waterproofing of underground water reservoirs and swimming pools
7193	Glass fibre base coaltar pitch and bitumen felts
7198	Code of practice for damp-proofing using bitumen mastic
7290	Recommendations for use of polyethylene film for waterproofing of roofs
9759	Guidelines for dewatering during construction
9918	Code of practice for application of silicone based water repellent
12027	Silicone-based water repellents
12054	Code of practice for application of silicone based water repellent
13182	Waterproofing and damp-proofing of wet areas in building Recommendations

JOINTS IN BUILDINGS (CONTROL OF CRACKS IN BUILDINGS)

1834	Hot applied sealing compound for joint in concrete
1838 (Part 1)	Performed fillers for expansion joint in concrete pavements and structures (non extruding and resilient type) : Part 1 Bitumen impregnated fibre
1838 (Part 2)	Performed fillers for expansion joint in concrete pavements and structures (non extruding and resilient type) : Part 2 CNSL Aldehyde resin and coconut pith
3414	Code of practice for design and installation of joints in buildings
10958	General check list of functions of joints in buildings
11433 (Part 1)	One part grade polysulphide based joint sealant : Part 1 General Requirements
11817	Classification of joints in buildings for accommodation of dimensional deviations during construction
11818	Method of test for laboratory determination of air permeability of joints in buildings
12118 (Part 1)	Two parts polysulphide based sealant : Part 1 General requirements

WHITE WASHING, COLOUR WASHING AND PAINTING OF MASONRY, CONCRETE AND PLASTER SURFACES (CALCAREOUS SURFACES)

44	Iron oxide pigments for paints
55	Ultramarine blue for paints
109	Ready mixed paint, brushing, priming, plaster, to Indian Standard Colour No. 361

	and 631 White and off white
133	Enamel, interior : (a) undercoating, (b) finishing
158	Ready mixed paint, brushing, bituminous, black lead-free, acid alkali and heat resisting
168	Ready mixed paint, air drying, for general purpose
427	Distemper, dry, colour as required
428	Distemper, oil emulsion, colour as required
702	Industrial bitumen
712	Building limes
2395 (Part 1)	Code of practice for painting concrete masonry and plaster surfaces : Part 1 Operation and workmanship
2395 (Part 2)	Code of practice for painting concrete masonry and plaster surfaces : Part 2 Schedule
2547 (Part 1)	Gypsum building plaster : Part 1 Excluding premixed lightweight plaster
2547 (Part 2)	Gypsum building plaster : Part 2 Premixed lightweight plaster
2932	Enamel, synthetic, exterior (a) undertaking (b) finishing
2933	Enamel, exterior (a) undertaking (b) finishing
3140	Code of practice for painting asbestos cement building products
3384	Specification for bitumen primer for use in waterproofing and damp proofing
5410	Cement paint
5411 (Part 1)	Plastic emulsion paint : Part 1 for interior use
5411(Part 2)	Plastic emulsion paint : Part 2 for exterior use
6278	Code of practice for whitewashing and colour washing
9862	Ready mixed paint, brushing, bituminous, black lead-free, acid alkali, water and chlorine resisting
PAINTING, VARNISHING AND ALLIED FINISHES (WOOD AND METALS)	
102	Ready mixed paint, brushing, red lead, non settling, painting
110	Ready mixed paint, brushing, Grey filler, for enamels for use over primers
117	Ready mixed paint, brushing, finishing exterior, semi-gloss for general purposes to Indian Standard Colours No. 101 to 104, 169,174,216, 217, 219, 275, 278, 280,281, 283, 352 to 354, 358 to 365, 384 to 388, 397, 410, 442 to 444
124 (Part 3)	Ready mixed paint, brushing, finishing exterior, semi-gloss for general purposes : Part 3 (superseding IS 119)
127	Ready mixed paint, brushing, finishing exterior, semi-gloss for general purposes white
128	Ready mixed paint, brushing, finishing exterior, semi-gloss for general purposes black
133	Enamel, interior : (a) undercoating, (b) finishing
137	Ready mixed paint, brushing, matt or eggshell flat, finishing, interior to Indian Standard colour as required
144	Ready mixed paint, brushing, petrol resisting, air-drying, for interior painting of tanks and container, red oxide (colour unspecified)
158	Ready mixed paint, brushing, bituminous, black lead-free, acid alkali and heat resisting
198	Varnish gold size
207	Gate and shutter hooks and eyes
337	Varnish, finishing interior
348	French polish
401	Code of practice for preservation of timber
423	Plastic wood for joiners filter
524	Varnish, finishing, exterior, synthetic, air drying
525	Varnish, finishing, exterior and general purposes
1477 (Part 1)	Code of practice for painting of ferrous metals in buildings : Part 1 Pretreatment
1477 (Part 2)	Code of practice for painting of ferrous metals in buildings : Part 2 Painting
2338 (Part 1)	Code of practice for finishing of wood and wood based materials : Part 1 Operations and workmanship
2338 (Part 2)	Code of practice for finishing of wood and wood based materials : Part 2 Schedules

2339	Aluminium paint for general purposes, in dual container
2554 (Part 1&2)	Code of practice for painting of non ferrous metals in buildings
2524 (Part 1)	Code of Practice for painting of non-ferrous metals in buildings ; Part 1 Pretreatment
2524 (Part 1)	Code of Practice for painting of non-ferrous metals in buildings ; Part 2 Painting
2932	Enamel, synthetic, exterior (a) undertaking (b) finishing
2933	Enamel, exterior (a) undertaking (b) finishing
3531	Glossary of terms relating to corrosion of metals
3536	Ready mixed paint, brushing, wood primer, pink
3537	Ready mixed paint, finishing interior, for general purposes, to Indian Standard Colours No. 101, 216, 217, 219, 275, 281, 352, 353, 358 to 361, 363, 364, 388, 410, 442, 444, 628, 631, 632, 634, 693, 697, white and black
3539	Ready mixed paint, undercoating for use under oil finishes to Indian Standard Colours, as required
3585	Ready mixed paint, aluminium, brushing priming water resistant, for woodwork
4597	Code of Practice for finishing of wood and wood based products with nitrocellulose and cold catalysed materials
6005	Code of practice for phosphating of iron and steel

WATER SUPPLY AND DRAINAGE

Part 1 Water Supply

1172	Code of basic requirements of water supply, drainage and sanitation
1239 (Part 1)	Mild steel tubes, tubular and other wrought steel fittings : Part 1 Mild steel tubes
1536	Centrifugally cast (spun) iron pressure pipes for water, gas and sewage
1537	Vertically cast iron pressure pipes for water, gas and sewage
1592	Asbestos cement pressure pipes
3114	Code of practice for laying of cast iron pipes
5822	Code of practice for welded steel pipes for water supply
1626 (Part 1)	Asbestos cement building pipes and pipe fittings, gutters and gutter fittings and roofing fittings : Part 1 (Pipe and pipe fittings)
2064	Selection, installation an maintenance of sanitary appliances - Code of practice
2065	Code of practice for water supply in buildings
2692	Ferrules for water services
3076	Low density polyethylene pipes of potable water supplies; sewage and industrial effluents
4984	Specification for high density polyethylene pipes for potable water supplies; sewage and industrial effluents
4985	Specification for unplasticised PVC pipes for potable water supplied
7558	Code of practice for domestic hot water installations
7634 (Part 2)	Code of practice for plastics pipe work for potable water supplies : Part 2 Laying and jointing polyethylene (PE) pipes
7634 (Part 3)	Code of practice for plastics pipe work for potable water supplies : Part 3 Laying and jointing of UPVC pipes
12183 (Part 1)	Code of practice for plumbing in multi-storeyed buildings : Part 1 Water supply
1916	Steel cylinder pipes with lining and coating
4127	Code of practice for laying of salt glazed stoneware pipes
12709	Glass fibre reinforced plastic pipes, joints and rings for potable water supply
3597	Concrete pipes-methods of test
7319	Perforated concrete pipes
NBC	National Building Code of India
SP 35 (S & T)	Handbook of water supply and drainage with special emphasis on plumbing

Part 2 Building Drainage

277	Galvanized steel sheet (plain and corrugated)
458	Precast concrete pipes (with and without reinforcement)
651	Salt glazed stoneware pipes and fittings
782	Caulking lead
783	Code of Practice for laying of concrete pipes
1230	Cast iron rainwater pipes and fittings

1536	Centrifugally cast (spun) iron pressure pipes for water, gas and sewage
1537	Vertically cast iron pressure pipes for water, gas and sewage
1592	Asbestos cement pressure pipes
1626 (Part 1)	Asbestos cement building pipes and pipe fittings, gutters and gutter fittings and roofing fittings : Part 1 (Pipe and pipe fittings)
1726	Cast iron manhole covers and frames
1742	Code of Practice for building drainage
3006	Specification for chemically resistant glazed stoneware pipes and fittings
4111 (Parts 1 to 5)	Code of Practice for ancillary structures in sewerage system
4733	Methods of sampling and test for sewage effluents
4984	Specification for high density polyethylene pipes for potable water supplies; sewage and industrial effluents
4985	Specification for unplasticised PVC pipes for potable water supplied
5329	Code of Practice for sanitary pipe work above ground for buildings
5455	Cast iron steps for manholes
12592 (Parts 1 & 2)	Precast manhole covers & frames
4350	Concrete porous pipes for Under drainage
2470 (Parts 1 & 2)	Code of Practice for installation of septic tank
784	Prestressed concrete pipes

SPECIAL CONSTRUCTION PROCEDURES EARTHQUAKE EFFECTS, Etc.

1893	Criteria for earthquake resistant design of structures
4326	Earthquake resistant design and construction of buildings- Code of practice
13920	Ductile detailing of reinforced concrete structures subjected to seismic forces - Code of practice
13935	Repair and seismic strengthening of buildings - Guidelines
4991	Criteria for blast resistant design of structures for explosions above ground
6922	Criteria for safety and design of structures subject to underground blasts
2190	Selection, installation and maintenance of first-aid fire extinguishers - Code of practice
3696 (Part 2)	Safety code of scaffolds and ladders : Part 2 Ladders
4912	Safety requirements for floor and wall openings, railings and toe boards

GENERAL

10005	S.I. units and recommendations for use of their multiples and of certain other units
6060	Code of practice for day lighting of factory buildings
3103	Code of practice for industrial ventilation
3483	Code of practice for noise reduction in industrial buildings
2440	Guide for day lighting of buildings
1200 (1 to 28)	Method of measurement of Building and Civil Engg. Works
7973	Code of practice for architectural and building working drawings
962	Code of practice for architectural and building drawings
13415	Code of safety for protective barrier in and around buildings
4801	Safety code for blasting and related drilling operations
8969	Safety code for erection of concrete framed structures

1.5.1 Samples and Tests of Materials

The Contractor shall submit samples of such materials as may be required by the Engineer-in-charge and shall carry out the specified tests directed by the Engineer-in-charge at the Site, at the supplier's premises or at a laboratory approved by the Engineer-in-charge.

Samples shall be submitted and tests carried out sufficiently early to enable further samples to be submitted and tested if required by the Engineer-in-charge.

Approval by the Engineer-in-charge as to the placing of orders for materials or as to samples or tests shall not prejudice any of the Employer's powers under the Contract.

1.5.2 Standards

Materials and workmanship shall comply with the relevant Indian Standards (with amendments upto date).
Where the relevant standard provides for the furnishing of a certificate to the Engineer-in-charge, at his request, stating that the materials supplied comply in all respects with the standard, the Contractor shall obtain the certificates and forward it to the Engineer-in-charge.
The specifications, standards and codes listed in this chapter are considered to be part of this Bid specification. All standards, specifications, codes of practices referred to herein shall be the latest editions including all applicable official amendments and revisions.

1.6 Earthwork

1.6.1 General

The Contractor shall furnish all tools, plant instruments, qualified supervisory personnel, labour, materials, any temporary works, consumables, any and everything necessary, whether or not such items are specifically stated herein for completion of the work in accordance with the Department's Requirements.
The Contractor shall survey the site before excavation and set out all lines and establish levels for various works such as grading, basement, foundations, plinth filling, roads, drains, cable trenches, pipelines etc. Such survey shall be carried out by taking accurate cross sections of the area perpendicular to established reference/grid lines at 8 m in case of buildings and 30 m in case of roads and pipe lines works intervals or nearer, if necessary, based on ground profile and thereafter properly recorded.
The excavation shall be carried out to correct lines and levels. This shall also include, where required, proper shoring to maintain excavations and also the furnishing, erecting and maintaining of substantial barricades around excavated areas and warning lamps at night.
Excavated material shall be dumped in regular heaps, bunds, riprap with regular slopes and levelling the same so as to provide natural drainage. Rock/soil excavated shall be stacked properly as approved by the Engineer-in-charge. As a rule, all softer material shall be laid along the centre of heaps, the harder and more weather resisting materials forming the casing on the sides and the top.
Topsoil shall be stock piled separately for later re-use.

1.6.2 Clearing

The area to be excavated/filled shall be cleared of fences, trees, plants, logs, stumps, bush, vegetation, rubbish, slush, etc. and other objectionable matter. If any roots or stumps of trees are encountered during excavation, they shall also be removed. The material so removed shall be disposed off as approved by the Engineer-in-charge. Where earthfill is intended, the area shall be stripped of all loose/ soft patches, top soil containing objectionable matter / materials before fill commences.

1.6.3 Excavation

Excavation for permanent work shall be taken out to such widths, lengths, depths and profiles as are shown on the approved drawings or such other lines and grades as may be agreed with the Engineer-in-charge Rough excavation shall be carried out to a depth of 150 mm above the final level. The balance shall be excavated with special care. Soft pockets shall be removed below the final level and extra excavation filled up with material as approved by the Engineer-in-charge. The final excavation should be carried out just prior to laying the blinding course.
To facilitate the permanent works the Contractor may excavate, and also backfill later, outside the lines shown on the approved drawings or as agreed with the Engineer-in-charge. Should any excavation be taken below the specified elevations, the Contractor shall fill it up with concrete of the same class as in the foundation resting thereon, upto the required elevation at no cost to the department.
All excavations shall be to the minimum dimensions required for safety and ease of working. Prior approval of the Engineer-in-charge shall be obtained by the Contractor in each individual case, for the method proposed for the excavation, including dimensions, side slopes, dewatering, disposal, etc. This approval, shall not in any way relieve the Contractor of his responsibility for any consequent loss or damage. The excavation must be carried out in the most expeditious and efficient manner. Side slopes shall be as steep as will stand safely for the actual soil conditions encountered. Every precaution shall be taken to prevent slips. Should slips occur, the slipped material shall be removed and the slope dressed to a modified stable slope.

1.6.4 Fill, Backfilling and Site Grading

1.6.4.1 General

All fill material shall be subject to the Engineer-in-charge's approval. If any material is rejected by Engineer-in-charge, the Contractor shall remove the same forthwith from the site. Surplus fill material shall be deposited/disposed off as directed by Engineer-in-charge after the fill work is completed.
No earthfill shall commence until surface water discharges and streams have been properly intercepted or otherwise dealt with to the approval of the Engineer-in-charge.

1.6.4.2 Material

To the extent available, selected surplus soil from excavations shall be used as backfill. Backfill material shall be free from lumps, organic or other foreign material. All lumps of earth shall be broken or removed unless otherwise stated. Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150 mm size, mixed with properly graded fine material consisting of murrum or earth to fill the voids and the mixture used for filling.

If fill material is required to be imported, the Contractor shall make arrangements to bring such material from outside borrow pits. The material and source shall be subject to the prior approval of the Engineer-in-charge. The approved borrow pit areas shall be cleared of all bushes, roots of trees, plants, rubbish, etc. Top soil containing foreign material shall be removed. The materials so removed shall be disposed of as directed by Engineer-in-charge. The Contractor shall provide the necessary access roads to borrow areas and maintain the same if such roads do not exist.

1.6.4.3 Filling in pits and trenches around foundations of structures, walls, etc.

The spaces around the foundations, structures, pits, trenches, etc., shall be cleared of all debris, and filled with earth in layers not exceeding 15 cm, each layer being watered, rammed and properly consolidated to the satisfaction of Engineer-in-charge. Earth shall be rammed with approved mechanical compaction machines. Usually no manual compaction shall be allowed unless the Engineer-in0Charge is satisfied that in some cases manual compaction by tampers cannot be avoided. The final backfill surface shall be trimmed and leveled to a proper profile to the approval of the Engineer-in-charge.

The filling shall be done after the concrete or masonry is fully set and done in such a manner as not to cause undue thrust on any part of the structure.

1.6.4.4 Plinth Filling

Plinth filling shall be carried out with approved material such as soil, sand or murum as in layers not exceeding 15 cm, watered and compacted with mechanical compaction machines. When filling reaches the finished level, the surface shall be flooded with water, unless otherwise directed, for at least 24 hours, allowed to dry and then the surface again compacted as specified above to avoid settlement at a later stage. The finished level of the filling shall be trimmed to the level/slope specified.

Compaction of large areas be carried out by means of 12 ton rollers smooth wheeled, sheep-foot or wobbly wheeled rollers. In case of compaction of granular material such as sands and gravel, vibratory rollers shall be used. A smaller weight roller may be used only if permitted by the Engineer-in-charge. As rolling proceeds, water sprinkling shall be done to assist consolidation. Water shall not be sprinkled in case of sandy fills.

The thickness of each unconsolidated fill layer can in this be upto a maximum of 300 mm. The Contractor will determine the thickness of the layers in which fill has to be consolidated depending on the fill material and equipment used and the approval of the Engineer-in-charge obtained prior to commencing filling.

The process of filling in the plinth, watering and compaction shall be carried out by the contractor in such a way as not to endanger the foundation columns, plinth walls etc. already built up. Under no circumstances Black cotton soil shall be used for plinth in filling.

Rolling shall commence from the outer edge and progress towards the centre and continue until compaction is to the satisfaction of Engineer-in-charge, but in no case less than 10 passes of the roller will be accepted for each layer.

The compacted surface shall be properly shaped, trimmed and consolidated to an even and uniform gradient. All soft spots shall be excavated, then filled and consolidated.

At some locations/ areas, it may not be possible to use rollers because of space restrictions, etc. The Contractor shall then be permitted to use pneumatic tampers, rammers, etc. and he shall ensure proper compaction.

1.6.4.5 Sand Filling in Plinth and Other Places

Where backfilling is required to be carried out with local sand it shall be clean, medium grained and free from impurities. The filled-in-sand shall be kept flooded with water for 24 hours to ensure maximum consolidation. The surface of the consolidated sand shall be dressed to required level or slope. Construction of floors or other structures on sand fill shall not be started until the Engineer-in-charge has inspected and approved the fill.

1.6.5 General Site Grading

Site grading shall be carried out as indicated in the approved drawings. Excavation shall be carried out as specified in the Department's Requirements. Filling and compaction shall be carried out as specified under Clause 1.6.4 and elsewhere unless otherwise indicated below.

If no compaction is called for, the fill may be deposited to the full height in one operation and levelled. If the

fill has to be compacted, it shall be placed in layers not exceeding 200 mm and levelled uniformly and compacted as indicated in Clause 1.6.4 before the next layer is deposited.

To ensure that the fill has been compacted as specified, field and laboratory tests shall be carried out by the Contractor.

Field compaction tests shall be carried out in each layer of filling until the fill to the entire height has been completed. This shall hold good for embankments as well. The fill will be considered as incomplete if the desired compaction has not been obtained.

The Contractor shall protect the earth fill from being washed away by rain or damaged in any other way. Should any slip occur, the Contractor shall remove the affected material and make good the slip.

1.6.6 Fill Density

Unless otherwise specified the compaction, where so called for, shall comply with minimum 90% compaction by Standard Proctor at moisture content differing not more than 4% from the optimum moisture content. The Contractor shall demonstrate adequately by field and laboratory tests that the specified density has been obtained.

1.6.7 Timber Shoring

The provisions of relevant ISS shall apply.

1.6.8 Dewatering

The Contractor shall ensure at his cost that the excavation and the structures are free from water during construction and shall take all necessary precautions and measures to exclude ground/ rain water so as to enable the works to be carried out in reasonably dry conditions in accordance with the construction programme. Sumps made for dewatering must be kept clear of the excavations/ trenches required for further work. The method of pumping shall be approved by Engineer-in-charge, but in any case, the pumping arrangement shall be such that there shall be no movement of subsoil or blowing in due to differential head of water during pumping. Pumping arrangements shall be adequate to ensure no delays in construction. The dewatering shall be continued for at least (7) seven days after the last pour of the concrete. The Contractor shall, however, ensure that no damage to the structure results on stopping of dewatering.

The Contractor shall study the sub-soil conditions carefully and shall conduct any test necessary at the site with the approval of the Engineer-in-charge to test the permeability and drainage conditions of the sub-soil for excavation, concreting etc., below ground level.

The scheme for dewatering and disposal of water shall be approved by the Engineer-in-charge. The Contractor shall suitably divert the water obtained from dewatering from such areas of site where a build up of water in the opinion of the Engineer-in-charge obstructs the progress of the work, leads to unsanitary conditions by stagnation, retards the speed of construction and is detrimental to the safety of men, materials, structures and equipment.

When there is a continuos inflow of water and the quantum of water to be handled is considered in the opinion of Engineer-in-charge, to be large, a well point system-single stage or multistage, shall be adopted. The Contractor shall submit to the Engineer-in-charge, details of his well point system including the stages, the spacing number and diameter of well points, headers etc., and the number, capacity and location of pumps for approval.

If any foundation pits are filled due to accumulation of surface flow during the progress of work or during rainy season, or due to any other cause all pumping required for dewatering the pits & removing silt shall be done without extra cost.

1.6.9 Rain Water Drainage

Grading in the vicinity of excavation shall be such as to exclude rain/ surface water draining into excavated areas. Excavation shall be kept clean of rain and such water as the Contractor may be using for his work by suitably pumping out the same. The scheme for pumping and discharge of such water shall be approved by the Engineer-in-charge.

1.7 Concrete

1.7.1 General

The Engineer-in-Charge shall have the right at all times to inspect all operations including the sources of materials, procurement, layout and storage of materials, the concrete batching and mixing equipment and the quality control system. Such an inspection shall be arranged and the *Engineer-in-Charge*'s approval obtained, prior to starting of concrete work. This shall, however, not relieve the Contractor of any of his responsibilities. All materials which do not conform to the Specifications shall be rejected.

Materials should be selected so that they can satisfy the design requirements of strength, serviceability, safety, durability and finish with due regards to the functional requirements and the environmental

conditions to which the structure will be subjected. Materials complying with codes/standards shall generally be used. Other materials may be used after approval of the Engineer-in-Charge and after establishing their performance suitability based on previous data, experience or tests.

1.7.2 Materials

1.7.2.1 Cement

Unless otherwise called for by the Engineer-in-charge, cement shall be ordinary Portland cement conforming to IS : 2697, IS : 8112 or IS : 12269. Super Sulphated cement conforming to IS 6909 or super resistant Portland cement conforming to IS 12330.

The makes of cement to be used in the contract works is to be got approved from the Engineer in Charge prior to starting of work.

Sulphate resistant cement conforming to IS 12330 shall be used for all cement concrete works below ground level at

- for all stretches along pipe alignment having soil resistivity below 1000 ohm-cm for guniting in MS pipe or for support structures/anchor blocks/thrust blocks to be laid having soil resistivity below 2000 ohm-cm for MS pipeline above ground,
- For all RCC works done in foundation (below ground) at head works.

Only one type of cement shall be used in any one mix. The source of supply, type or brand of cement within the same structure or portion thereof shall not be changed without approval from the Engineer-In-Charge.

Cement which is not used within 90 days from its date of manufacture shall be tested at a laboratory approved by the Engineer-In-Charge and until the results of such tests are found satisfactory, it shall not be used in any work.

1.7.2.2 Aggregates (General)

It shall comply with requirement of IS 383 and as specified in IS 456-2000. Aggregates shall consist of naturally occurring stones (crushed or uncrushed), gravel and sand. They shall be chemically inert, strong, hard, clean, durable against weathering, of limited porosity, free from dust/slit/organic impurities/deleterious materials such as iron pyrites, cod, mica, slate, clay alkali, soft fragments, sea shells and conform to IS : 383. Aggregates such as slag, crushed over burnt bricks, bloated clay aggregates, sintered fly ash and tiles shall not be used.

Aggregates shall be washed and screened before use where necessary or if directed by the Engineer-in-Charge.

Aggregates containing reactive silica shall not be used.

The maximum size of coarse aggregate shall be as stated on the drawings but in no case greater than ¼ of the minimum thickness of the member.

Plums 160 mm and above of a reasonable size may be used in mass concrete fill where directed. Plums shall not constitute more than 20% by volume of the concrete when specifically permitted. The plums shall be distributed evenly and shall not be closer than 160 mm from the surface. For heavily reinforced concrete members as in the case of ribs of main beams the nominal maximum size of aggregate shall be restricted to 5 mm less than minimum clear distance between the main bars or 5 mm less than the minimum cover to reinforcement whichever is smaller. Coarse and fine aggregates shall preferably batched separately, specially for design mix concrete.

The largest possible size, properly graded should be used in order to reduce water demand.

Graded aggregate shall confirm to requirements in Table 1, 2, 3 & 4. All in aggregate shall confirm to requirements in Table 5.

Table 1 (Graded Aggregate)

IS Sieve Designation	Percentage Passing for Normal size of Aggregate			
Mm	40 mm	20 mm	16 mm	12.5 mm
80	100	-	-	-
40	95-100	100	-	-
20	30-70	95-100	100	100
16	-	-	90-100	-
12.5	-	-	-	90-100
10	10-35	25-55	30-70	40-85
4.75	0-5	0-10	0-10	0-10
2.36	-	-	-	-

Table 2

Single Sized Aggregate (Ungraded)

IS Sieve Designation	Percentage Passing for Normal size of Aggregate					
Mm	63 mm	40 mm	20 mm	16 mm	12.5 mm	10 mm
80	100	-	-	-	-	-
63	85-100	100	-	-	-	-
40	0-30	85-100	100	-	-	-
20	0-5	0-20	85-100	100	-	-
16	-	-	-	85-100	100	-
12.5	-	-	-	-	85-100	100
10	0-5	0-5	0-20	0-30	0-45	85-100
4.75	-	-	0-5	0-5	0-10	0-20
2.36	-	-	-	-	-	0-5

Table 3

Making Single Sized to Graded Aggregate

Cement Concrete Mix	**Nominal size of Graded Aggregate Required**	Part of Single Size Aggregate to be Mixed to Get Graded Aggregate (by Volume)				
		50 mm	40 mm	20 mm	12.5 mm	10 mm
1:6:12	63	9	-	3	-	-
	40	-	9	3	-	-
1:5:10	63	7.5	-	2.5	-	-
	40	-	7.5	2.5	-	-
1:4:8	63	6	-	2	-	-
	40	-	6	2	-	-
1:3:6	63	4.5	-	1.5	-	-
	40	-	4.5	1.5	-	-
	20	-	-	4.5	-	1.5
1:2:4	40	-	2.5	1	-	0.5
	20	-	-	3	-	1
	12.5	-	-	-	3	1
1:1.5:3	20	-	-	2	-	1

Note : *Proportions indicated are by volume. If single sized aggregate specified is not* available*, the volume of single sized aggregates shall be varied with a view to obtain the graded aggregate.*

Table 4

Grading of Fine Aggregates

IS Sieve Designation	Percentage Passing for			
	Grading Zone I	Grading Zone II	Grading Zone III	Grading Zone IV
10 mm	100	100	100	100
4.75 mm	90-100	90-100	90-100	90-100
2.36 mm	60-95	75-100	85-100	95-100
1.18 mm	30-70	55-90	75-100	90-100
600 micron	15-34	35-59	60-79	80-100
300 micron	5-20	8-30	12-40	15-50
150 micron	0-10	0-10	0-10	0-15

Note : For crushed stone sands***, the possible limit on 150 micron IS sieve is increased to 20 percent. This does not affect 5 percent allowance permitted to other sieves.***

Table 5

All-in-Aggregate Grading

IS Sieve Designation	Percentage Passing All-in-Aggregate Grading of	
Mm	40 mm Nominal Size	16 mm Nominal Size
80	100	-
40	95-100	95-100
20	45-75	95-100
4.75 mm	25-45	30-50
600 micron	8-30	10-35
150 micron	0-6	0-6

Fine aggregates are divided into 4 zones. Typical good sand falls in Zone II grading, however, finer or coarse sand may be used with suitable adjustment in the ratio of quantities of coarse to fine aggregates.

Very fine sands as included in Zone IV grading should not be used except when the concrete is closely controlled by design mixes.

1.7.2.3 Water

Water used for both mixing and curing shall conform to IS : 456-2000 and free from injurious amounts of oils, acids, alkalis, salts, sugar, organic materials that may be deleterious to concrete or steel. The pH value of water shall not be less than 6.

1.7.2.4 ***Reinforcement***

Reinforcement shall be any of the following :

(i) High strength deformed bars and wires to IS 1786.

(ii) Rolled steel Grade A made from structural steel to IS 2062.

All reinforcement shall be free from loose mill scales, loose rust and coats of paints, oil, mud or other coatings which may destroy or reduce bond.

1.7.2.5 Admixtures

Accelerating, retarding, water reducing and air entraining admixtures shall conform to IS : 9103 and integral water proofing admixtures to IS : 2645.

Admixtures may be used in concrete as per manufacturer's instructions only with the approval of the Engineer-in-Charge. An admixture's suitability and effectiveness shall be verified by trial mixes with the other materials used in the works. If two or more admixtures are to be used simultaneously in the same concrete mix, their interaction shall be checked and trial mixes done to ensure their compatibility. There should also be no increase in risk of corrosion of the reinforcement or other embedments.

Calcium chloride shall not be used for accelerating set of the cement for any concrete containing reinforcement or embedded steel parts. When calcium chloride is permitted such as in mass concrete works, it shall be dissolved in water and added to the mixing water by an amount not exceeding 1.5 percent of the weight of the cement in each batch of concrete. The designed concrete mix shall be corrected accordingly.

1.7.3 Samples and Tests

All materials used for the works shall be tested before use.

Manufacturer's test certificate shall be furnished for each batch of cement /steel and when directed by the Engineer samples shall also be got tested by the Contractor in a laboratory approved by the Engineer-in-Charge.

Sampling and testing shall be as per IS : 2386 under the supervision of the Engineer-in-Charge.

Water to be used shall be tested to comply with requirements of IS : 456.

The Contractor shall furnish manufacturer's test certificates and technical literature for the admixture proposed to be used. If directed, the admixture shall be got tested at an approved laboratory at no extra cost.

1.7.4 Concrete

1.7.4.1 General

Concrete grade shall be as designated on approved drawings. In concrete grade M15, M20 etc. the number represents the specified characteristic compressive strength of 150 mm cube at 28 days, expressed in N/sq. mm as per IS : 456. Concrete in the works shall be "DESIGN MIX CONCRETE" or "NOMINAL MIX CONCRETE". All concrete works of grade M5, M7.5, M10, and M15 shall be NOMINAL MIX CONCRETE. Grade M20 and

above shall necessarily be DESIGN MIX CONCRETE.

1.7.4.2 Design Mix Concrete

The mix design shall produce concrete having reduced workability (consistency) and strength not less than approximate values given in table below. Workability shall be controlled by direct measurement of water content and checking it at frequent intervals by method prescribed in IS 1199.

a) Mix Design and Testing

For Design Mix Concrete, the mix shall be designed according to IS : 10262 and SP 23 to provide the grade of concrete having the required workability and characteristic strength not less than appropriate values given in IS:456. The design mix shall be cohesive and does not segregate and should result in a dense and durable concrete and also capable of giving the finish as specified. For liquid retaining structures, the mix shall also result in water tight concrete. The Contractor shall exercise great care while designing the concrete mix and executing the works to achieve the desired result.

The minimum cement content for Design Mix Concrete shall be as per IS:456.

The minimum cement content stipulated above shall be adopted irrespective of whether the Contractor achieves the desired strength with less quantity of cement. The Contractor's quoted rates for concrete shall provide for the above eventuality and nothing extra shall become payable to the CONTRACTOR in this account. Even in the case where the quantity of cement required is higher than that specified above to achieve desired strength based on an approved mix design, nothing extra shall become payable to the CONTRACTOR.

It shall be the Contractor's sole responsibility to carry out the mix designs at his own cost. He shall furnish to the Engineer-in-Charge at least 30 days before concreting operations, a statement of proportions proposed to be used for the various concrete mixes and the strength results obtained. The strength requirements of the concrete mixes ascertained on 150 mm cubes as per IS : 516 shall comply with the requirements of IS : 456.

Grade of Concrete	**Minimum Compressive Strength N/sq.mm at 7 days**	**Specified Characteristic Compressive Strength N/sq. mm at 28 days**
M15	10.0	15.0
M20	13.5	20.0
M25	17.0	25.0
M30	20.0	30.0
M35	23.5	35.0
M40	27.0	40.0

Grades lower than M20 shall not be used for reinforced concrete (general) Grading lower than M25 shall not be used for reinforced concrete in liquid retaining structures.

A range of slumps which shall generally be used for various types of construction unless otherwise instructed by the Engineer-in-Charge is given below:

Structure / Member	**Slump in millimeters**	
	Maximum	**Minimum**
Reinforced foundation walls and footings	75	25
Plain footings, caissons and substructure walls	100	25
Slabs, Beams and reinforced walls	75	25
Pump & miscellaneous Equipment Foundations	100	25
Building columns	50	25
Pavements	50	25
Heavy mass construction	50	25

b) Batching & Mixing of Concrete

Proportions of aggregates and cement, as decided by the concrete mix design, shall be by weight. These proportions shall be maintained during subsequent concrete batching by means of weigh batchers capable of controlling the weights within one percent of the desired value.

Amount of water added shall be such as to produce dense concrete of required consistency, specified strength and satisfactory workability and shall be so adjusted to account for moisture content in the

aggregates. Water-cement ratio specified for use by the Engineer-in-Charge shall be maintained. Each time the work stops, the mixer shall be cleaned out and while recommencing, the first batch shall have 10% additional cement to allow for sticking in the drum.

Arrangement should be made by the Contractor to have the cubes tested in an approved laboratory or in field with prior consent of the Engineer-in-Charge. Sampling and testing of strength and workability of concrete shall be as per IS:1199, IS : 516 and IS : 456.

1.7.4.3 Nominal Mix Concrete

a) Mix Design & Testing

Mix Designing and preliminary tests are not necessary for Nominal Mix Concrete. However works tests shall be carried out as per IS : 456. Proportions for Nominal Mix Concrete and w/c ratio may be adopted as per Table 9 of IS : 456. However it will be the Contractor's sole responsibility to adopt appropriate nominal mix proportions to yield the specified strength.

b) Batching & Mixing of Concrete

The Proportions of materials used for concrete of grades shall be as given below :

Proportions for Nominal Mix of Concrete

Grade of Concrete	Total Quantity for Dry Aggregate by Mass per 50 kg of Cement (as Sum of Fine and Coarse Aggregates), in kg, Max	Proportion of Fine Aggregate to Coarse Aggregate (by Mass)	Quantity of Water per 50 kg of Cement, Max in Litres
M 5	800	Generally 1:2 Subject to an upper limit of 1:1.5 and a lower limit of 1:2.5	60
M 7.5	625	-do-	45
M 10	480	-do-	34
M 15	350	-do-	32
M 20	250	-do-	30

NOTES

a) The proportions of the fine to coarse aggregates should be adjusted from upper limit to lower limit progressively as the grading of the fine aggregates becomes finer and maximum size of coarse aggregate becomes larger. Graded coarse aggregate (see Table 5.1) shall be used.

b) Example : For an average grading of fine aggregate (that is, Zone II of IS 383 :1970, Table 4) the proportions shall be 1:1.5, 1:2 and 1:2.5 for maximum size of aggregates 10 mm, 20 mm and 40 mm respectively.

c) 2. This table envisages batching by weight,. Volume batching when done the nominal mixes would roughly be 1:3:6, 1:2:4 and 1:1.5:3 for M 10, M 15 and M 20 respectively.

d) 3. For underwater concreting the quantity of coarse aggregate, either by volume or mass, shall not be less than 1.5 times nor more than twice that of the fine aggregate.

c) Mixing

Concrete shall be mixed in a mechanical mixer conforming to IS 1791. The mixing shall be continued until there is uniform distribution of materials and the mass is uniform in colour and consistency. If there is segregation after unloading, the concrete should be remixed.

1.7.5 Formwork

Formwork shall be all inclusive and shall consist of but not be limited to shores, bracings, sides of footings, walls, beams and columns, bottom of slabs etc. including ties, anchors, hangers, inserts, falsework, wedges etc.

The design and engineering of the formwork as well as its construction shall the responsibility of the Contractor, However, if so desired by the Engineer-in-Charge, the drawings and calculations for the design of the formwork shall be submitted to the Engineer-in-Charge for the approval.

Formwork shall be designed to fulfill the following requirements:

(i) Sufficiently rigid and tight to prevent loss of grout or mortar from the concrete at all stages and appropriate to the methods of placing and compacting.
(ii) Made of suitable materials.
(iii) Capable of providing concrete of the correct shape and surface finish within the specified tolerance limits.
(iv) Capable of withstanding without deflection the worst combination of self weight, reinforcement and concrete weight, all loads and dynamic effects arising from construction and compacting activities, wind and weather forces.
(v) Capable of easy striking out without shock, disturbance or damage to the concrete.
(vi) Soffit forms capable of imparting a camber if required
(vii) Soffit forms and supports capable of being left in position if required
(viii) Capable of being cleaned and/or coated if necessary immediately prior to casting the concrete; design temporary openings where necessary for these purposes and to facilitate and the preparation of construction joints.

The formwork may be of timber, plywood, steel, plastic or concrete depending upon the type of finish specified. Sliding forms and slip form may be used with the approval of the Engineer-in-Charge. Timber for formwork shall be well seasoned, free from sap, shakes, loose knots, worm holes, warps and other surface defects. Joints between formwork and structures shall be sufficiently tight to prevent loss of slurry from concrete, using seals if necessary.

The faces of formwork coming in contact with concrete shall be cleaned and two coats of approved mould oil applied before fixing reinforcement. All rubbish, particularly chippings, shavings, sawdust, wire pieces dust. etc. shall be removed from the interior of the forms before the concrete is placed. Where directed, cleaning of forms shall be done by blasting with a jet of compressed air at no extra cost.

Forms intended for reuse shall be treated with care. Forms that have deteriorated shall not be used. Before reuse, all forms shall be thoroughly scraped, cleaned, nails removed, holes suitably plugged, joints repaired and warped lumber replaced to the satisfaction of the Engineer-in-Charge. The Contractor shall equip himself with enough shuttering to allow for wastage so as to complete the job in time.

Permanent formwork shall be checked for its durability and compatibility with adjoining concrete before it is used in the structure. It shall be properly anchored to the concrete.

Wire ties passing through beams, columns and walls shall not be allowed. In their place bolts passing through sleeves shall be used. Formwork spacers left in-situ shall not impair the desired appearance or durability of the structure by causing spalling, rust staining or allowing the passage of moisture.

For liquid retaining structures, sleeves shall not be provided for through bolts nor shall through bolts be removed if provided. The bolts, in the latter case, shall be cut at 25 mm depth from the surface and the hole made good by cement mortar of the same proportion as the concrete just after striking the formwork.

Where specified all corners and angles exposed in the finished structure shall have chamfers or fillets of 20 mm x 20 mm size.

Forms for substructure may be omitted when, in the opinion of the Engineer-in-Charge, the open excavation is firm enough (in hard non-porous soils) to act as a form. Such excavations shall be larger, as approved by the Engineer-in-Charge, than that required as per drawing to compensate for irregularities in excavation.

The Contractor shall provide adequate props carried down to a firm bearing without overloading any of the structures.

The shuttering for beams and slabs shall be so erected that the side shuttering of beams can be removed without disturbing the bottom shuttering. If the shuttering for a column is erected for the full height of the column, one side shall be built up in sections as placing of concrete proceeds or windows left for placing concrete from the side to limit the drop of concrete to 1.0 m or as approved by the Engineer-in-Charge. The Contractor shall temporarily and securely fix items to be cast (embedments/ inserts) in a manner that will not hinder the striking of forms or permit loss of grout.

Formwork showing excessive distortion, during any stage of construction, shall be repositioned and strengthened. Placed concrete affected by faulty formwork, shall be entirely removed and formwork corrected prior to placement of new concrete at Contractor's cost.

1.7.6 Preparation Prior to Concrete Placement

Before concrete is actually placed in position, the inside of the formwork shall be cleaned and mould oil applied, inserts and reinforcement shall be correctly positioned and securely held, necessary openings, pockets, etc. provided.

All arrangements- formwork, equipment and proposed procedure, shall be approved by the Engineer-in-Charge. Contractor shall maintain separate Pour Card for each pour as per the format enclosed.

1.7.7 Check for Reinforcement and concreting

All reinforcement shall be checked and recorded prior to pouring of concrete by an authorised representative of the engineer in Charge. Similarly the entire concrete pouring work shall be done in the presence of authorised representative. The contractor shall therefore give a notice of a minimum three days to the engineer in Charge or his representative such that the works can be checked by him or his authorised representative.

1.7.8 Transporting, Placing and Compacting Concrete

Concrete shall be transported from the mixing plant to the formwork with minimum time lapse by methods that shall maintain the required workability and will prevent segregation, loss of any ingredients or ingress of foreign matter or water. During hot or cold weather, concrete shall be transported in deep containers other suitable measures to reduce loss of water by evaporation and heat loss in cold weather may also be adopted. In all cases concrete shall be deposited as nearly as practicable directly in its final position to avoid rehandling. To avoid segregation, concrete shall not be rehandled or caused to flow. For locations where direct placement is not possible and in narrow forms and Contractor shall provide suitable drops and "Elephant Trunks". Concrete shall not be dropped from a height of more than 1.0 m. Care shall be taken to avoid displacement of reinforcement or formwork.

Concrete shall not be placed in flowing water. Under water, concrete shall be placed in position by tremies or by pipeline from the mixer and shall never be allowed to fall freely through the water.

While placing concrete the Contractor shall proceed as specified below and also ensure the following :

(i) Continuously between construction joints and pre-determined abutments.
(ii) Without disturbance to forms or reinforcement
(iii) Without disturbance to pipes, ducts, fixings and the like to be cast in; ensure that such items are securely fixed. Ensure that concrete cannot enter open ends of pipes and conduits etc.
(iv) Without dropping in a manner that could cause segregation or shock.
(v) In deep pours only when the concrete and formwork designed for this purpose and by using suitable chutes or pipes.
(vi) Do not place if the workability is such that full compaction cannot be achieved
(vii) Without disturbing the unsupported sides of excavations; prevent contamination of concrete with earth. Provide sheeting if necessary in supported excavations, withdraw the linings progressively as concrete is placed.
(viii) If placed directly onto hardcore or any other porous material, dampen the surface to reduce loss of water from the concrete.
(ix) Ensure that there is no damage or displacement to sheet membranes.
(x) Record the time and location of placing structural concrete.

Concrete shall normally be compacted in its final position within thirty minutes of leaving the mixer. Concrete shall be compacted during placing with approved vibrating equipment without causing segregation until it forms a solid mass free from voids thoroughly worked around reinforcement and embedded fixtures and into all corners of the formwork. Immersion vibrators shall be inserted vertically at points not more than 450 mm apart and withdrawn slowly till air bubbles cease to come to the surface, leaving no voids. When placing concrete in layers advancing horizontally, care shall be taken to ensure adequate vibration, blending and melding of the concrete between successive layers. Vibrators shall not be allowed to come in contact with reinforcement, formwork and finished surfaces after start of initial set. Over-vibration shall be avoided; under vibration is likewise harmful.

The vibrator should penetrate rapidly to the bottom of the layer and atleast 15 cm into the preceding layer if there is any. It should be held generally 5 to 15 sec. until the compaction is considered adequate and then withdrawn slowly at thereof about 8 cm/s.

Concrete may be conveyed and placed by mechanically operated equipment after getting the complete procedure approved by the Engineer-in-Charge. The slump shall be held to the minimum necessary for conveying concrete by this method. When concrete is to be pumped, the concrete mix shall be specially designed to suit pumping. Care shall be taken to avoid stoppages in work once pumping has started.

Except when placing with slip forms, each placement of concrete in multiple lift work, shall be allowed to set for at least 24 hours after the final set of concrete before the start of subsequent placement. Placing shall stop when concrete reaches the top of the opening in walls or bottom surface of slab, in slab and beam construction, and it shall be resumed before concrete takes initial set but not until it has had time to settle as approved by the Engineer-in-Charge. Concrete shall be protected against damage until final acceptance.

1.7.9 Mass Concrete Works

Sequence of pouring for mass concrete works shall be as approved by the Engineer-in-Charge. The

Contractor shall exercise great care to prevent shrinkage cracks and shall monitor the temperature of the placed concrete if directed.

1.7.10 Curing

Curing and protection shall start immediately after the compaction of the concrete to protect it from

a) Premature drying out, particularly by solar radiation and wind;

- leaching out by rain and flowing water;
- rapid cooling during the first few days after placing;
- high internal thermal gradient;
- low temperature of frost;
- vibration and impact which may disrupt the concrete and interfere with its bond to the reinforcement
- After the concrete has begun to harden i.e. 1 to 2 hr. after laying curing shall be started.
- All concrete, unless approved otherwise by the Engineer-in-Charge, shall be cured by use of continuous sprays or ponded water or continuously saturated coverings of sacking, canvas, hessain or other absorbent material for the period of complete hydration with a minimum of 7 days. The quality of curing water shall be the same as that used for mixing.
- Where a curing membrane is approved to be used by the Engineer-in-Charge, the same shall of a non-wax base and shall not impair the concrete finish in any manner. The curing compound to be used shall be approved by the Engineer-in-Charge before use and shall be applied with spraying equipment capable of a smooth, even textured coat.
- When concrete is used as subgrade for flooring, the flooring may be commenced before the curing period of subgrade is over, but curing of subgrade shall be continued along with the top layer of flooring for a minimum period of 7 days.
- Curing may also be done by covering the surface with an impermeable material such as polyethylene, which shall be well sealed and fastened.

1.7.11 Construction Joints and Keys

The position and arrangement of construction joints shall be as indicated by the contractor in his working drawings dually approved by the department. Concrete shall be placed without interruption until completion of work between construction joints. If stopping of concreting becomes unavoidable anywhere, a properly formed construction joint shall be made with the approval of the Engineer-in-Charge.

Dowels for concrete work, not likely to be taken up in the near future, shall be coated with cement slurry and encased in lean concrete as indicated on the drawings or as approved by the Engineer-in-Charge.

Before resuming concreting on a surface which has hardened all laitance and loose stone shall be thoroughly removed by wire brushing/hacking and surface washed with high pressure water jet and treated with thin layer of cement slurry for vertical joints and horizontal layers.

When concreting is to be resumed on a surface which has not fully hardened, all laitance shall be removed by wire brushing, the surface wetted, free water removed and a coat of cement slurry applied. On this, a layer of concrete not exceeding 150 mm thickness shall be placed and well rammed against the old work. Thereafter work shall proceed in the normal way.

For horizontal joints, the surface shall be covered with a layer of mortar about 10-15 mm thick composed of cement and sand in the concrete mix. This cement slurry or mortar shall be freshly mixed and applied immediately before placing concrete.

1.7.12 Foundation Bedding

All earth surfaces upon which or against which concrete is to be placed, shall be well compacted and free from standing water, mud or debris. Soft or spongy areas shall be cleaned out and filled with either soil-cement mixture, lean concrete or clean sand compacted as approved by the Engineer-in-Charge. The surfaces of absorptive soils shall be moistened.

Concrete shall not be deposited on large sloping rock surfaces. The rock shall be cut to form rough steps or benches by picking, barring or wedging. The rock surface shall be kept wet for 2 to 4 hours before concreting.

Excavation, in clay or other soils that are likely to be affected by exposure to atmosphere, shall be concreted as soon as they are dry. Alternatively, unless otherwise mentioned the bottom of the excavation shall be protected immediately by 8 cm thick layer of cement concrete not leaner than M10 or in order to obtain a

dry hard bottom, the last stretch of excavation of about 10 cm shall be removed just before concreting.

1.7.13 Repair and Replacement of Unsatisfactory Concrete

Immediately after the shuttering is removed, all defective areas such as honey-combed surfaces, rough patches, holes left by form bolts etc, shall be inspected by the Engineer-in-Charge who may permit patching of the defective areas or reject the concrete work.

All through holes for shuttering shall be filled for full depth and neatly plugged flush with surface.

Rejected concrete shall be removed and replaced by the Contractor at no additional cost to the Employer.

For patching of defective areas all loose materials shall be removed and the surface shall be prepared as approved by the Engineer-in-Charge.

Bonding between hardened and fresh concrete shall be done either by placing cement mortar or by applying epoxy. The decision of the Engineer-in-Charge as to the method of repairs to be adopted shall be final and binding on the Contractor. The surface shall be saturated with water for 24 hours before patching is done with cement sand mortar. The use of epoxy for bonding fresh concrete shall be carried out as approved by the Engineer-in-Charge.

1.7.14 Hot Weather Requirements

Concreting during hot weather shall be carried out as per IS 7861 (Part I).

Adequate provision shall be made to lower concrete temperatures which shall not exceed 40 deg C at time of placement of fresh concrete.

Where directed by the Engineer-in-Charge, the Contractor shall spray non-wax based curing compound on unformed concrete surfaces at no extra costs.

1.7.15 Cold Weather Requirements

Concreting during cold weather shall be carried out as per IS:7861(Part II).

The ambient temperature during placement and upto final set shall not fall below 5 deg. C. Approved antifreeze/accelerating additives shall be used where directed.

For major and large scale concreting works the temperature of concrete at times of mixing and placing, the thermal conductivity of the formwork and its insulation and stripping period shall be closely monitored.

1.7.16 Liquid Retaining Structures

The Contractor shall take special care for concrete for liquid retaining structures, underground structures and those others specifically called for to guarantee the finish and water tightness.

The Contractor shall make all arrangements for hydro-testing of structure, all arrangements for testing such as temporary bulk heads, pressure gauges, pumps, pipe lines etc.

The Contractor shall also make all temporary arrangements that may have to be made to ensure stability of the structures during construction.

Any leakage that may occur during the hydro-test or subsequently during the defects liability period or the period for which the structure is guaranteed shall be effectively stopped either by cement/epoxy pressure grouting, guniting or such other methods as may be approved by the engineer-in-charge. All such rectification shall be done by the contractor to the entire satisfaction of the engineer-in-charge at no extra cost to the department.

1.7.17 Testing Concrete Structures for Leakage

Hydro-static test for water tightness shall be done at full storage level or soffit of cover slab, as may be directed by the Engineer-in-Charge, as described below :

In the case of structures whose external faces are exposed, such as elevated tanks, the requirements of the test shall be deemed to be satisfied if the external faces show no sign of leakage or sweating and remain completely dry during the period of observation of seven days after allowing a seven day period for absorption after filling with water.

In the case of structures whose external faces are buried and are not accessible for inspection, such as underground tanks, the structures shall be filled with water and after the expiry of seven days after the filling, the level of the surface of the water shall be recorded. The level of water shall be recorded again at subsequent intervals of 24 hrs. over a period of seven days. Backfilling shall be withheld till the tanks are tested. The total drop in surface level over a period for seven days shall be taken as an indication of water tightness of the structure. The Engineer-in-Charge shall decide on the actual permissible nature of this drop in the surface level, taking into account whether the structures are open or closed and the corresponding effect it has on evaporation losses. Unless specified otherwise, a structure whose top is covered shall be deemed to be water tight if the total drop in the surface level over a period of seven days does not exceed 40 mm.

Each compartment/segment of the structure shall be tested individually and then all together.

For structures such as pipes, tunnels etc. the hydrostatic test shall be carried out by filling with water, after

curing as specified, and subjecting to the specified test pressure for specified period. If during this period the loss of water does not exceed the equivalent of the specified rate, the structure shall be considered to have successfully passed the test.

1.8 Structural Steel Work

1.8.1 Fabrication

1.8.1.1 General

As much fabrication work as is reasonably practicable work shall be completed in shops, where steel work is fabricated.

All workmanship and finish shall be of the best quality and shall conform to the best approved method of fabrication. All materials shall be finished straight and shall be machined/ground smooth true and square where so specified. All holes and edges shall be free of burrs. Shearing and chipping shall be neatly and accurately done and all portions of work exposed to view shall be neatly finished. Tolerances for fabrication of steel structures conform IS 7215. Tolerances for erection of steel structures shall conform to IS 12843.

1.9 Building Details

1.9.1 Brickwork

1.9.1.1 Materials

Bricks used in the works shall conform to the requirements laid down in IS: 1077, IS 2180, IS 2222, IS 2691, IS 3952, IS 6165. The class of the bricks shall be as specifically indicated in the respective items of work prepared by the Contractor.

Bricks shall have following dimensions:

	Length Mm	**Width Mm**	**Height mm**
Non Modular Bricks	230	110	70
	230	110	30

Common burnt clay bricks are classified on the basis of compressive strength as given below:

Class designation	10	7.5	5	3.5
Avg. compressive strength N/ mm^2	10	7.5	5	3.5

Bricks shall be sound, hard, and homogenous in texture, well burnt in kiln without being vitrified, hand/ machine moulded, deep red, cherry or copper coloured, of regular shape and size and shall have sharp and square edges with smooth rectangular faces. The bricks shall be free from pores, cracks, flaws and nodules of free lime. They shall have smooth rectangular faces with sharp corners and shall be uniform in colour; tolerance of brick dimension shall be $\pm$ 3% for designation 10 & above and $\pm$ 8% for lower designation. Hand moulded bricks shall be moulded with a frog and those made by extrusion process may not be provided with a frog. Bricks shall give a clear ringing sound when struck.

1.9.1.2 The sample size for all the tests shall be as follows:

Brick	**Lot size**	**Sample Size**
Class 10	more than 50000 bricks	20 bricks
7.5, 5, 3.5	more than 100000 bricks	20 bricks

The sampling shall be at random & samples shall be stored in a dry place until tests are done.

1.9.1.3 Compressive strength:

Five bricks shall be tested. The average compressive strength shall be as per class designation. The compressive strength of individual brick shall not be less than 20 % of the specified value.

1.9.1.4 Water absorption:

Five bricks shall be tested for water absorption and shall not exceed 20 % by weight upto class 12.5 & 15% by weight for higher classes.

1.9.1.5 Efflorescence:

Five bricks shall be tested for efflorescence. The efflorescence shall be 'nil' to 'moderate'

Sample bricks shall be submitted to the Engineer-in-Charge for approval and bricks supplied shall conform to approved samples. If demanded by Engineer-in-Charge, brick samples shall be got tested as per IS : 3495 by Contractor. Bricks rejected by Engineer-in-Charge shall be removed from the site of works within 24 hours.

Mortar for brick masonry shall consist of cement and sand.

Mortar leaner than 1.5 and richer than 1:3 shall not be used.

1.9.1.6 Preparation of mortar

a) Materials

1) Water:

Water used shall be clean and reasonably free from injurious or deleterious materials such as oils, acids, alkalis, salts. The pH value of water shall not be less than 6.

2) Cement:

Cement shall conform to any of the following :

33 Grade	Ordinary	Portland	Cement	IS : 2697
43 Grade	Ordinary	Portland	Cement	IS : 8112
53 Grade	Ordinary	Portland	Cement	IS : 12269

3) Sand:

Sand for masonry mortars shall confirm to IS 2116

1.9.1.7 Preparation of mortars:

Mortars shall be prepared and tested as per IS 2250. Mixing of cement mortar shall be done in mechanical mixers.

1.9.1.8 Workmanship

Workmanship of brick work shall conform to IS : 2212. All bricks shall be thoroughly soaked in clear water for at least one hour immediately before being laid. The cement mortar for brick masonry work shall be as specified in the respective item of work prepared by the Contractor. Brick work 230 mm thick and over shall be laid in English Bond unless otherwise specified. 100mm/ 115 mm thick brickwork shall be laid with stretchers. For laying bricks, a layer of mortar shall be spread over the full width of suitable length of the lower course. Each brick shall be slightly pressed into the mortar and shoved into final position so as to embed the brick fully in mortar. Only full size bricks shall be used for the works and cut bricks utilised only to make up required wall length or for bonding. Bricks shall be laid with frogs uppermost.

All brickwork shall be plumb, square and true to dimensions shown. Vertical joints in alternate courses shall come directly one over the other and be in line. Horizontal courses shall be levelled. The thickness of brick courses shall be kept uniform. In case of one brick thick or half brick thick wall, atleast on e face should be kept smooth and plane, even if the other is slightly rough due to variation in size of bricks. For walls of thickness greater than on e brick both faces shall be kept smooth and plane. All interconnected brickwork shall be carried out at nearly one level so that there is uniform distribution of pressure on the supporting structure and no portion of the work shall be left more than one course lower than the adjacent work. Where this is not possible, the work be raked back according to bond (and not saw toothed) at an angle not exceeding 45 deg. But in no case the level difference between adjoining walls shall exceed one meter. Brick work shall not be raised more than one metre per day.

Bricks shall be so laid that all joints are well filled with mortar. The thickness of joints shall not be less than 6 mm and not more than 10 mm. The face joints shall be raked to a minimum depth of 10 mm/ 15 mm by raking tools during the progress of work when the mortar is still green, so as to provided a proper key for the plastering/ pointing respectively to be done later. When plastering or pointing is not required to be done, the joints shall be uniform in thickness and be struck flush and finished at the time of laying. The face of brickwork shall be cleaned daily and all mortar droppings removed. The surface of each course shall be thoroughly cleaned of all dirt before another course is laid on top.

During harsh weather conditions, newly built brick masonry works shall be protected by tarpaulin or other suitable covering to prevent mortar being washed away by rain.

Brickwork shall be kept constantly moist on all the faces for at least seven days after 24 hrs of laying. The arrangement for curing shall be got approved from the Engineer-in-Charge.

Double scaffolding having two sets of vertical supports shall be provided to facilitate execution of the masonry works. The scaffolding shall be designed adequately considering all the dead, live and possible impact loads to ensure safety of the workmen, in accordance with the requirements stipulated in IS : 2750 and IS : 3696 (Part - I). Scaffolding shall be properly maintained during the entire period of construction. Single scaffolding shall not be used on important works and will be permitted only in certain cases as decided by the Engineer-in-Charge. Where single scaffolding is adopted, only minimum number of holes, by omitting a header shall be left in the masonry for supporting horizontal scaffolding poles. All holes in the masonry shall be carefully made good before plastering/ pointing.

In the event of usage of traditional bricks of size 230 mm x 115 mm x 75 mm, the courses at the top of the plinth and sills as well as at the top of the wall just below the roof/ floor slabs and at the top of the parapet shall be laid with bricks on edge.

All brick work shall be built tightly against columns, floor slabs or other structural members.

To overcome the possibility of development of cracks in the brick masonry following measures shall be adopted.

For resting RCC slabs, the bearing surface of masonry wall shall be finished on top with 12 mm thick cement mortar 1:3 and provided with 2 layers of Kraft paper Grade 1 as per IS : 1397 or 2 layer of 50 micron thick polyethylene sheets.

RCC/ steel beams resting on masonry wall shall be provided with reinforced concrete bed blocks of 150 mm thickness, projecting 150mm on either sides of the beam, duly finished on top with 2 layer of Kraft paper Grade 1 as per IS : 1397 or 2 layers of 50 micron thick polyethylene sheets.

Steel wire fabric shall be provided at the junction of brick masonry and concrete before taking up plastering work.

Bricks for partition walls shall be stacked adjacent to the structural member to predeflect the structural member before the wall is taken up for execution. Further, the top most course of half or full brick walls abutting against either a deshuttered slab or beam shall be built only after any proposed masonry wall above the structural member is executed to cater for the deflection of the structural element.

Reinforced cement concrete transomes and mullions of dimensions as indicated in the construction Drawings to be prepared by the Contractor are generally required to be provided in the half brick partition walls.

Where the drawings prepared by the Contractor indicate that structural steel sections are to be encased in brickwork, the brickwork masonry shall be built closely against the steel section, ensuring a minimum of 20 mm thick cement-sand mortar 1:4 over all the steel surfaces. Steel sections partly embedded in brickwork shall be provided with bituminous protective coating to the surfaces at the point of entry into the brick masonry.

1.10 Damp - proof Course

All the walls in a building shall be provided with damp-proof course covering plinth to prevent water from rising up the wall. The damp-proof course shall run without a break throughout the length of the wall, even under the door or other opening. Damp-proof course shall consist of minimum 50mm thick cement concrete of 1:2:4 nominal mix with nominal reinforcement and approved water-proofing compound admixture conforming to IS:2645 in proportion as directed by the manufacturer. Concrete shall be with 10mm down graded coarse aggregates.

The surface of brick work/stone masonry work shall be levelled and prepared before laying the cement concrete. Side shuttering shall be properly fixed to ensure that slurry does not leak through and is also not disturbed during compaction. The upper and side surface shall be made rough to afford key to the masonry above and to the plaster. Damp-proof course shall be cured properly for at least seven days after which it shall be allowed to dry for taking up further work.

1.11 Miscellaneous Inserts, Bolts etc.

All the miscellaneous inserts such as bolts, pipes, plate embedments etc., shall be accurately installed in the building works at the correct location and levels, all as detailed in the construction Drawing to be prepared by the Contractor. Contractor shall prepare and use templates for this purpose, if so directed by the Engineer-in-Charge. In the event, of any of the inserts are improperly installed, contractor shall make necessary arrangement to remove and reinstall at the correct locations/levels all as directed by the Engineer-in-Charge.

1.12 Steel Doors, Windows and Ventilators

Hot rolled steel sections for the fabrication of steel doors, windows and ventilators shall conform to IS : 7452 which are suitable for single glazing.

Pressed steel door frames for steel flush doors shall be out of 1.25mm thick mild steel sheets of profiles as per IS : 4351.

Transparent sheet glass shall conform to the requirements of IS : 2835. Wired and figured glass shall be as per IS : 5437.

Builder's hardware of fittings and fixtures shall be of the best quality from the approved manufacturers.

Hot rolled sections shall confirm to IS 7452 Fire check doors shall conform to IS 3614 Part 1 & 2. Steel windows for industrial buildings shall confirm to IS 1361.

1.13 In-Situ Cement Concrete Floor Topping

1.13.1 Materials

The mix proportion for the in-situ concrete floor topping shall be 1:2.5:3.5 (one part cement : two and half parts sand : three and half parts coarse aggregates) by volume unless otherwise specified.

The aggregates shall conform for the requirements of IS : 383.

Coarse aggregates shall have high hardness surface texture and shall consist of crushed rock of granite,

basalt, trap or quartzite. The aggregate crushing valve shall not exceed 30 percent. The grading of the aggregates of size 12.5 mm and below shall be as per IS : 2571.
Grading of the sand shall be within the limits indicated in IS : 2571.

1.13.2 Workmanship

The thickness of the floor topping shall be as specified in the items of work prepared by the Contractor. The minimum thickness of the floor topping shall be 25 mm.
Preparation of base concrete /structural slab before laying the topping shall be as per relevant clause. The surface shall be rough to provide adequate bond for the topping.
Mixing of concrete shall be done thoroughly in mechanical mixer unless hand mixing is specifically permitted by the Engineer-in-Charge. The concrete shall be as stiff as possible and the amount of water added shall be the minimum necessary to give just sufficient plasticity for laying and compacting. The mix shall be used in the work within 30 minutes of the addition of water for its preparation.
Floor finish shall be laid in suitable panels to reduce the risk of cracking. No dimension of a panel shall exceed 2 meters and the length of a panel shall not exceed one and a half times its breadth. Topping shall be laid in alternate panels, the intermediate panels being cast after a gap of atleast one day. Construction joints shall be plain vertical butt joints.
Screed strips shall be fixed dividing the area into suitable panels. Immediately before depositing the concrete topping, neat cement slurry at 2.75 kg/sq.m. of area shall be thoroughly brushed into the prepared surface. Topping shall then be laid, very thoroughly tamped, struck off level and floated with wooden float. The surface shall then be tested with a straight edge and mason's spirit level to detect any inequalities and these shall be made good immediately.
Finishing of the surface by troweling shall be spread over a period of one to six hours depending upon the temperature and atmospheric conditions. The surface shall be trowelled 3 times at intervals so as to produce a smooth uniform and hard surface. Immediately after laying, the first trowelling just sufficient to give a level surface shall be carried out avoiding excessive trowelling at this stage. The surface shall be re-trowelled after sometime to close any pores and to scrap off excess water or laitance, which shall not be trowelled back into the topping. Final trowelling shall be done well before the concrete has become too hard but at time when considerable pressure is required to make any impression on the surface. Sprinkling of dry cement or cement sand mixture for absorbing moisture shall not be permitted.
Immediately after the surface is finished, it shall be protected suitably from rapid drying due to wind/sunlight. After the surface has hardened sufficiently to prevent any damage to it, the topping shall be kept continuously moist for a minimum period of 10 days.
It is preferable to lay the topping on hardened base concrete, as against being laid monolithically with a lesser thickness, since proper levels and slopes with close surface tolerances is achievable in practice, owing to its greater thickness. Further, as this would be laid after all other building operations are over, there will be no risk of any damages or discoloration to the floor finish which are difficult to repair satisfactorily.

1.14 Water -Proofing

1.14.1 General

The work shall include waterproofing for the building roofs, terraces, toilets, floor slabs, walls, and any other areas and at any other locations and situations as directed by the Engineer-In-Charge. The water proofing shall be done only for flat slabs.
The waterproofing treatment shall be carried out on top of brick bat coba laid in cement sand mortar 1:4 in square pattern having a thickness 75 to 100 mm so as to maintain a roof slope of 1 in 60. The brick bats shall be covered by 25 mm thick finishing coat of cement sand mortar 1:4 mix including water proofing compound @ 2% of cement used.
The work shall be carried out by an experienced specialist Sub-Contractor who shall be appointed only after prior approval of the Engineer-in-Charge.

1.14.2 Modified Bituminous Membrane

Modified Bituminous Membrane shall be "SUPER THERMOLAY" 4 mm thick weighing 4 Kg/sq.m, manufactured using APP Polymer modified bitumen with a central core of non-woven polyester reinforcement (200 gms/sqm) and with top and bottom layers of thermofusible film (top layer could also be sand finished) made by STP Limited, in collaboration with Bitumat Company Limited. "PLYFLEX" of Bitumat Company Limited, Saudi Arabia supplied by STP Limited shall also be acceptable or other equivalent specification.

1.14.3 Water proofing of Horizontal Surfaces (Pumping Station)

The waterproofing shall be applied as follows:
Bitumen primer shall confirm to IS:3384. Bitumen felt shall confirm to IS:1322 & IS:7193. Bonding material

for used between successive felts and between roof surface and felt shall confirm to industrial blown type bitumen of grade 85/25 or 90/15 confirming to IS:702. For top dressing bitumen shall be industrial blown type as per IS:702 of penetration note more than 40.

A roll of Modified Bituminous Membrane shall be unrolled over the primed surface and completely bonded to the substrate by pressing down even for the full width of the roll using a wooden roller. Torching shall be done, where recommended by the manufacture and where directed by the Engineer-in-Charge, as the unrolling progresses.

The side overlaps shall be minimum 100 mm whereas the end overlaps shall be minimum 150 mm; both shall be bonded and sealed by flame torching.

Care shall be taken that the membrane is lapped with the treatment along the vertical surface and roof gutter treatment for at least 500 mm.

The membrane shall be properly overlapped/terminated at all openings, rainwater downtakes etc. to ensure that such junctions do not become sources of leakage.

Top of membrane finally shall be painted with antiglouse reflective paint.

Waterproofing of Vertical Surfaces at Roof Level and Gutters

The waterproofing shall be applied as described in (a) above.

Modified Bituminous membrane shall be unrolled and bonded to the substrate after applying a coat of bitumen and by pressing down evenly for the full width of the roll.

Light torching shall be done to ensure complete bonding.

The membrane shall be overlapped with treatment for the horizontal surface by at least 500 mm.

The membrane shall be taken upto a pre-cut chase anchored and sealed.

Khurras and Rainwater Down Pipes

Down pipes shall be isolated from RCC work with 6 mm polyethylene foam fixed with adhesive (Araldite) and sealed with silicone sealant prior to laying membrane. A water proofing flashing composed of one layer of Hessain based self finished felt Type 3 Grade 1 and two layers of aluminium foil of 0.075 mm thickness shall be provided. This flashing shall be carried into the down take pipes for at least 150 mm and sealed with hot bitumen. The Contractor shall closely coordinate the work with the agency providing and fixing the rainwater down take pipes.

Testing

The treated area (flat and horizontal only shall be tested by allowed water to stand on the treated areas to a depth of 150 mm for a minimum period of 72 hours.

The treated area (flat and horizontal) shall have continuous slope towards the rainwater outlets and no water shall pond any where on the surface.

1.15 Cement Plastering Work

1.15.1 Materials

The proportions of the cement mortar for plastering shall be 1:4 (one part of cement to four parts of sand). Cement and sand shall be mixed thoroughly in dry condition and then just enough water added to obtain a workable consistency. The quality of water and cement shall be as per relevant IS standards. The quality and grading of sand for plastering shall conform to IS : 1542. The mixing shall be done thoroughly in a mechanical mixer unless hand mixing is specifically permitted by the Engineer-in-Charge. If so desired by the Engineer-in-Charge sand shall be screened and washed to meet the Specifications. The mortar thus mixed shall be used as soon as possible preferably within 30 minutes from the time water is added to cement. In case the mortar has stiffened due to evaporation of water this may be re-tempered by adding water as required to restore consistency but this will be permitted only upto 30 minutes from the time of initial mixing of water to cement. Any mortar which is partially set shall be rejected and removed forthwith from the site. Droppings of plaster shall not be re-used under any circumstances.

1.15.2 Workmanship

Preparation of surfaces and application of plaster finishes shall generally conform to the requirements specified in IS : 1661 and IS : 2402.

Plastering operations shall not be commenced until installation of all fittings and fixtures such as door/ window panels, pipes, conduits etc. are completed.

All joints in masonry shall be raked as the work proceeds to a depth of 10 mm / 20mm for brick/ stone masonry respectively with a tool made for the purpose when the mortar is still green. The masonry surface to be rendered shall be washed with clean water to remove all dirt, loose materials, etc., Concrete surfaces to be rendered shall be roughened suitably by hacking or bush hammering for proper adhesion of plaster and the surface shall be evenly wetted to provide the correct suction. The masonry surfaces should not be too wet only damp at the time of plastering. The dampness shall be uniform to get uniform bond between the

plaster and the masonry surface.

a) Interior plain faced plaster
This plaster shall be laid in a single coat of 12 mm thickness. The mortar shall be dashed against the prepared surface with a trowel. The dashing of the coat shall be done using a strong whipping motion at right angles to the face of the wall or it may be applied with a plaster machine. The coat shall be trowelled hard and tight forcing it to surface depressions to obtain a permanent bond and finished to smooth surface. Interior plaster shall be carried out on jambs, lintel and sill faces, etc. as shown in the drawing and as directed by the Engineer-in-Charge.

b) Plain Faced Ceiling plaster
This shall be applied in a single coat of 6 mm thickness. Application of mortar shall be as stipulated in above paragraph.

c) Exterior plain faced plaster
This plaster shall be applied in 2 coats. The first coat or the rendering coat shall be approximately 14 mm thick. The rendering coat shall be applied as stipulated above except finishing it to a true and even surface and then lightly roughened by cross scratch lines to provide bond for the finishing coat. The rendering coat shall be cured for atleast two days and then allowed to dry. The second coat or finishing coat shall be 6mm thick. Before application of the second coat, the rendering coat shall be evenly damped. The second coat shall be applied from top to bottom in one operation without joints and shall be finished leaving an even and uniform surface. The mortar proportions for the coats shall be as specified in the respective item of work. The finished plastering work shall be cured for atleast 7 days.

Interior plain faced plaster 20 mm thick if specified for uneven faces of brick walls or for random/ coursed rubble masonry walls shall be executed in 2 coats similar to the procedure stipulated in above paragraph.

For external plaster, the plastering operation shall be commenced from the top floor and carried downwards. For internal plaster, the plastering operations for the walls shall commence at the top and carried downwards. Plastering shall be carried out to the full length of the wall or to natural breaking points like doors/ windows etc. Ceiling plaster shall be completed first before commencing wall plastering.

Double scaffolding to be used shall be as specified in clause 1.9.1.8.

The finished plaster surface shall not show any deviation more than 4mm when checked with a straight edge of 2 m length placed against the surface.

To overcome the possibility of development of cracks in the plastering work following measures shall be adopted.

a) Plastering work shall be deferred as much as possible so that fairly complete drying shrinkage in concrete and masonry works take place.

b) Steel wire fabric shall be provided at the junction of brick masonry and concrete to overcome reasonably the differential drying shrinkage/ thermal movement.

c) Ceiling plaster shall be done, with a trowel cut at its junction with wall plaster. Similarly trowel cut shall be adopted between adjacent surfaces where discontinuity of the background exists.

1.16 Cement Pointing

1.16.1 Materials

The cement mortar for pointing shall be in the proportion of 1:3 (one part of cement to three parts of fine sand). Sand shall conform to IS : 1542 and shall be free from clay, shale, loam, alkali and organic matter and shall be of sound, hard, clean and durable particles. Sand shall be approved by Engineer-in-Charge and if so directed it shall be washed/ screened to meet specification requirements.

1.16.2 Workmanship

Where pointing of joints in masonry work is specified, the joints shall be raked at least 15 mm/ 20 mm deep in brick/ stone masonry respectively as the work proceeds when the mortar is still green.

Any dust/ dirt in the raked joints shall be brushed out clean and the joints shall be washed with water. The joints shall be damp at the time of pointing. Mortar shall be filled into joints and well pressed with special steel trowels. The joint shall not be disturbed after it has once begun to set. The joints of the pointed work shall be neat. The lines shall be regular and uniform in breadth and the joints shall be raised, flat, sunk or 'V' as may be specified in the respective items of work. No false joints shall be allowed.

The work shall be kept moist for atleast 7 days after the pointing is completed. Wherever coloured pointing has to be done, the colouring pigment of the colour required shall be added to cement in such proportions as

recommended by the manufacturer and as approved by the Engineer-in-Charge.

1.17 Water-Proofing Admixtures

Water-proofing admixtures shall conform to the requirements of IS : 2645 and shall be of approved manufacture. The admixture shall not contain calcium chloride. The quantity of the admixture to be used for the works and method of mixing etc. shall be as per manufacturer's instructions and as directed by the Engineer-in-Charge.

1.18 Painting of Concrete, Masonry & Plastered Surfaces

1.18.1 Materials

Oil bound distemper shall conform to IS : 428. The primer shall be alkali resistant primer of the same manufacture as that of the distemper.

Lead free acid, alkali and chlorine resisting paint shall conform to IS: 9862.

Colour wash shall be made by addition of a suitable quantity of mineral pigment, not affected by lime, to the prepared white wash to obtain the shade/ tint as approved by the Engineer-in-Charge.

All the materials shall be of the best quality from an approved manufacturer. Contractor shall obtain prior approval of the Engineer-in-Charge for the brand of manufacture and the colour/ shade. All materials shall be brought to the site of works in sealed containers.

1.18.2 Workmanship

Contractor shall obtain the approval of the Engineer-in-Charge regarding the readiness of the surfaces to receive the specified finish, before commencing the work on painting.

Painting of new surfaces shall be deferred as much as possible to allow for thorough drying of the sub-strata.

The surfaces to be treated shall be prepared by thoroughly brushing them free from dirt, mortar droppings and any loose foreign materials. Surfaces shall be free from oil, grease and efflorescence. Efflorescence shall be removed only by dry brushing of the growth. Cracks shall be filled with Gypsum. Workmanship of painting shall generally conform to IS : 2395.

1.18.3 White Wash

The prepared surfaces shall be wetted and the finish applied by brushing. The operation for each coat shall consist of a stroke of the brush first given horizontally from the right and the other from the left and similarly, the subsequent stroke from bottom upwards and the other form top downwards, before the first coat dries. Each coat shall be allowed to dry before the next coat is applied. Minimum of 2 coats shall be applied unless otherwise specified. The dry surface shall present a uniform finish without any brush marks.

1.18.4 Colour Wash

Colour wash shall be applied in the same way as for white wash. A minimum of 2 coats shall be applied unless otherwise specified. The surface shall present a smooth and uniform finish without any streaks. The finished dry surface shall not show any signs of peeling/ powdery and come off readily on the hand when rubbed.

1.18.5 Cement Paint

The prepared surfaces shall be wetted to control surface suction and to provide moisture to aid in proper curing of the pain. Cement paint shall be applied with a brush with stiff bristles. The primer coat shall be a thinned coat of cement paint. The quantity of thinner shall be as per manufacturer's instructions. The coats shall be vigorously scrubbed to work the paint into any voids for providing a continuous paint film free form pinholes for effective water proofing in addition to decoration. Cement paint shall be brushed in uniform thickness and the covering capacity for two coats on plastered surfaces shall be 3 to 4 kg/ sq.m. A minimum of 3 coats of the same colour shall be applied. Atleast 24 hours shall be left after the first coat to become sufficiently hard before the second coat is applied. The painted surfaces shall be thoroughly cured by sprinkling with water using a fog spray at least 2 to 3 times a day. Curing shall commence after about 12 hours when the paint hardens. Curing shall be continued for atleast 2 days after the application of final coat. The operations for brushing each coat shall be as detailed above.

1.18.6 Oil bound Distemper

The prepared surfaces shall be dry and provided with one coat of alkali resistant primer by brushing. The surface shall be finished uniformly without leaving any brush marks and allowed to dry for atleast 48 hours. A minimum of two coats of oil bound distemper shall be applied, unless otherwise specified. The first coat shall be of a lighter tint. Atleast 24 hours shall be left after the first coat to become completely dry before the application of the second coat. Broad, stiff, double bristled distemper brushed shall be used for the work. The operations for brushing each coat shall be as detailed above.

1.18.7 Acid, Alkali Resisting Paint

A minimum of 2 coats of acid/ alkali resisting paint shall be applied over the prepared dry surfaces by brushing. Primer coat shall be as per manufacturer's instructions.

1.18.8 Acrylic Emulsion Paint

Acrylic emulsion paint shall be applied in the same way as for plastic emulsion paint. A minimum of 2 finishing coats over one coat of primer shall be provided unless otherwise specified.

1.19 Painting of Steel Work

1.19.1 Materials

- Zinc chrome primer shall conform to IS : 2074
- Synthetic enamel paint shall conform to IS : 2932
- Aluminium paint shall conform to IS : 2339

All the materials shall be of the best quality from an approved manufacturer. Contractor shall obtain prior approval of the Engineer-in-Charge for the brand of manufacture and the colour/ shade. All the materials shall be brought to the site in sealed containers.

1.19.2 Workmanship

Painting work shall be carried out only on thoroughly dry surfaces. Painting shall be applied either by brushing or by spraying. Contractor shall procure the appropriate quality of paint for this purpose as recommended by the manufacturer. The workmanship shall generally conform to the requirement of IS : 1477 (Part 2).

The type of paint, number of costs etc. shall be as specified in the respective items of work.

Primer and finish paint shall be compatible with each other to avoid cracking and wrinkling. Primer and finish paint shall be from the same manufacturer.

All the surfaces shall be thoroughly cleaned of oil, grease, dirt, rust and scale. The methods to be adopted using solvents, wire brushing, power tool cleaning etc., shall be as per IS: 1477 (Part - I) and as indicated in the item of work.

It is essential to ensure that immediately after preparation of the surfaces; the first coat of red oxide-zinc chrome primer shall be applied by brushing and working it well to ensure a continuous film without holidays. After the first coat becomes hard dry, a second coat of primer shall be applied by brushing to obtain a film free from 'holidays'. After the second coat of primer is hard dry, the entire surface shall be wet rubbed cutting down to a smooth uniform surface. When the surface becomes dry, the under cost of synthetic enamel paint of optimum thickness shall be applied by brushing with minimum of brush marks. The coat shall be allowed to hard-dry. The under coat shall then be wet rubbed cutting down to a smooth finish, taking adequate care to ensure that at no place the undercoat is completely removed. The surface shall then be allowed to dry.

The first finishing coat of paint shall be applied by brushing and allowed to hard-dry. The gloss from the entire surface shall then be gently removed and the surface dusted off. The second finishing coat shall then be applied by brushing.

Atleast 24 hours shall elapse between the application of successive coats. Each coat shall vary slightly in shade and this shall be got approved by the Engineer-in-Charge.

1.20 Electrical Panel and Lighting System

1.20.1 Scope

This part of specifications covers supply and installation of all equipment necessary for a complete lighting systems at Pump House, buildings, in campus areas etc.

1.20.2 General Requirements

The Lighting system includes the following items

a) Lighting fixtures complete with Lamps and accessories
b) Lighting system equipment
   i) Light control switches, receptacle units with control switch units, lighting wires, conduits and other similar items necessary to complete lighting system
   ii) Lighting fixture supports, street lighting poles and flood light towers
   iii) Lighting main distribution board, lighting panels.
   iv) Multi core cables for street, boundary and flood lighting
   v) Provision of automatic on-off road switches through solar system

1.20.3 Lighting System Component Equipment

1.20.3.1 Lighting Wires

(a) The wires for wiring in lighting system shall be 250 /440 V, 1/ / C, PVC insulated, unarmoured with stranded copper conductors and shall be laid in recessed conduit unless otherwise specified..

(b) The minimum area of conductors shall be 1.5 sq. mm for receptacles rated 15 A and 5 A Receptacles and 2.5 sq. mm for receptacles rated 15 A and above.

(c) The wires shall be coded white for phase / positive of D.C. and black for neutral / negative of D.C.

1.20.3.2 Conduits

(a) Rigid steel / non-metallic conduits and their associated fittings as required shall conform to applicable standards. The minimum size of conduit shall be 20 mm for surface installation and 25 mm for concealed installation.

(b) Steel conduits shall be seamed by welding and hot dip gavanised. They shall be supplied in standard lengths of 5 m.

(c) Supply of conduits shall include all associated fitting like couplers, bends and tees as required for lighting system installation work.

1.20.3.3 Junction Boxes

(a) Junction boxes with terminals shall be supplied for branching and terminating lighting cables when required for outdoor areas, 3 phase receptacles etc.

(b) The Junction Boxes shall be dust and vermin proof and shall be fabricated from 14 gauge sheet steel and shall be complete with removable cover plate with gaskets, two earthing terminals each with nut, bolt and washer. Boxes shall be additionally weather proof.

(c) The boxes shall have provision for wall, column, pole or structure mounting and shall be provided with cable / conduit entry knock outs, terminal blocks, HRC fuses as required.

(d) The terminal blocks, with specified number of terminals, shall be mounted securely on brackets welded to the back sheet of the box. The terminals shall be 600 V, grade one piece construction complete with terminals, insulation barriers, galvanised nuts, bolts and washers and provided with identification strips of PVC. The terminals shall be made of copper alloy and shall be of box clamp type.

(e) The boxes shall be painted with on shop coat of red oxide zinc chromate primmer followed by a finishing coat of paint.

1.20.3.4 Lighting Poles and Flood Light Pole Mounting

(a) Lighting poles for street light and flood light shall be of stepped tubular steel poles construction as per applicable standard. These poles shall be coated with bituminous preservative paints on the inside as well as embedded outside surface. Exposed outside surface shall be painted with one coat of red lead oxide primer. After completion of installation two coats of aluminium shall be applied.

(b) Poles for mounting flood lights shall be supplied whenever required. Unless otherwise specified, poles, shall be painted with Red lead oxide primer and two coats of aluminium paint. A steel ladder shall be provided. The length of each step of the ladder shall be at least 300 mm and spacing between two adjacent steps not more than 300 mm.

(c) The supply of poles shall be complete with fixing bracket / necessary pipe reducer for fixing the fitting and also include the necessary associated pole mounted junction boxes. The required size of poles and the junction box shall be as per the requirement.

Specifications Of OHSR

1.0 Over Head Service Reservoir

The civil works should be carried out in accordance with Rajasthan PWD specifications and explanatory notes of building and house drainage in latest version. In case where the PWD specifications and specifications given in the tender documents are silent about any aspect in respect of any item, the work shall be carried out as per relevant IS code of practice in the latest version and as per sound engineering practice as decided by the Engineer in charge.

Some of the important IS codes to be referred during execution of the work are as follows.

Earth work

- IS: 3764 - Safety code for excavation works.
- IS: 3720 - Methods of tests for soils.

Concrete works

- IS: 280 - Mild steel wire for general engineering purposes.
- IS : 269 - Portland cement
- IS : 383 - Coarse & fine aggregate
- IS: 432 - Medium tension steel bars & hard drawn steel wire.
- IS: 456 - Code of practice for plain & reinforced cement.
- IS: 516 - Method for testing for strength of concrete.
- IS: 1199 - Method of sampling & analysis of concrete.
- IS: 1156 - Fabric reinforcement.
- IS: 2062 - Structural steel.
- IS: 2086 - Methods of tests for aggregates of concrete.
- IS : 2502 - Code of practice for bending & fixing of bars for concrete reinforcement
- IS: 3370- Code for practice for concrete structures for the storage of liquids.
- IS : 7861- Recommended practice for hot weather concreting (part-I)
- IS: 1200- Method of measurements.

Sluice Valves IS 14846-CI sluice valves (PN 1.0) 2000

Bulk flow meter ISO- 4064/1/Class B

The contractor shall provide & maintain a benchmark with a level & at a location approved by Engineer-in-charge at each construction site. All levels shall be deemed to refer to that benchmark. The contractor may establish other secondary benchmarks on the site.

Cement concrete (plain or reinforced) shall comply with the reinforcement of specifications of Rajasthan PWD (B&R) specification and explanatory notes for building and House Drainage except in so far as these are not altered or modified by specific stipulations as given on the specifications herein.

The concrete mixes to be used shall be as following:

-Water bearing structure including roof	M 25
-Other structural concrete	M 20 or M 15 as per drawing
-Lean concrete in foundations	as per drawing

The aggregates and cement shall be proportioned by weight only. The mixing shall invariably be carried out in mechanical mixer and in such a way so as to avoid any loss of water or cement. No hand mixed concrete will be allowed.

To obtain a dense concrete and to reduce chances of honey combing, water proofing compound of standard make as approved by the Engineer in charge shall be used in concrete work. The quality of the admixture shall be as prescribed by the manufacture and as approved by the Engineer in charge.

Being water retaining structures, they bear high degree of importance and such cement manufactured by the mini plants shall not be allowed to be used.

1.1 Concrete work

During the progress of construction sampling, preparation of test specimens, curing and testing of concrete shall be conducted in accordance with IS 1199 and IS 516, to determine whether the concrete being produced complies with the strength requirements as specified.

1.1.1 Detailed Design:

The detailed design, structural design & drawings (including reinforcement detailing & bar bending schedule) shall have to prepared taking provisions of dead load, water load, live load, seismic load. Wind load, point load, due to load etc. & shall be checked for most critical condition resulting for various load combinations. The design shall be based on no crack basis for water retaining components.

Capacity of the tank shall be the volume of water it can store between the designed full supply level & lowest supply level (i.e. the top level of the tip of the outlet pipe) Height of staging shall be the difference between the lowest supply of tank & the average Ground level of the tank site.

The design of container part should be base on working stress method (Elastic theory) & concept of ultimate load theory, limit state theory should not be used However staging & foundation may be design by adopting LIMIT STATE method..

Tank portion should be designed using membranes theory 7 then should be checked & corrected for continuity analysis. It implies that higher of 2 forces arrived by membranes theory & continuity analysis should be used for actual structural design.

Concrete strength should be based on 28 days characteristic strength of concrete.

Circular shaft/shaft staging is not allowed

1. **The SBC is to be ascertained by the contractor but min. 7.00 MT/Sqm is to be taken at 2.50** M. depth The contractor shall himself make assessment of SBC for design purpose. Soil bearing capacity shall be got tested by the contractor in accordance with IS: 1988-1971 (amended up to date) through an approved agency (As decided by the design approving authority of the department) for which no additional payment shall be made by the department. It is clarified that actual design shall be based on lower of two values and no extra payment/ claim shall be entertained by the department on this account.

1.1.2 Loads

Load shall be taken of all loads due to dead loads, live loads, wind loads, water pressure, soil pressure & point loads, caused during installation.

Load for top dome shall be taken as 1.5 Kn/Sqm. The plate form, balcony & stair designed for a live load of 3.0 KN/Sqm in addition to other loads.

OHSR is situated in seismic Zone number II & the seismic load shall be taken accordingly.

Water depth including free board & deed storage shall be considered for design of tank.

A minimum dead storage of 15 cm. should be provided in addition to the required capacity as stipulated in tender documents

In vertical reinforcement should be provided in two layers i.e. near to both face of wall.

Four number extra bars should be provided at each junction of column & bracing which should be extended sufficiently on either side to develop sufficient strength by bond & ensure transmission of binding moment adequately.

In view of uncertain pattern of load (imposed load) on top dome, allowable, max permissible stress are restricted to 20% of provision in BIS for normal conditions for the purpose of structural design of top dome. As wind/earth quake are basic loads on brace, while designing brace no increase should be allowed over permissible stresses. Brace should be designed using steel beam theory.

1.1.3 Concrete Mixes:

In view of provisions in table 3 of IS: 456-2000, Environmental expose condition may be treated as under for the purpose of structural design & construction:

Container part & foundation Moderate

Staging Part Moderate

Minimum grade of concrete, minimum normal over value to be adopted, minimum cement concrete & maximum free water cement ratio shall be governed on the basis of exposed condition as classified above it should be noted carefully that nominal mix concept should not be allowed for mix richer than M 20 & only design mix concrete should be acceptable.
The tenderer shall got the mix for required grade of concrete done from engineering college for which samples of cement, aggregate, sand, water etc. shall be taken to engineering college through Engineer in charge & design shall be submitted along with design OHSR for approval.

S.No.	Particulars	Proportion of mix
1	PCC in Foundation	M-15 grade concrete aggregate size 20mm nominal
2	Foundation slab, raft & staircases & foundation ring beam.	M-25 grade concrete only
3	Column & braces	M-25 grade concrete only
4	Bottom ring beam, over column, conical wall, balcony beam & or slab, vertical wall, top ring beam, top flat & dome roof & bottom dome i.e. parts coming in contact with water or enclosure or water tank.	M-25 grade concrete only

Concrete cover & thickness:
The normal cover to meet durability requirement should be sent as per table 16 of IS: 456-2000. However, the minimum clear cover of reinforcement bars shall be as following:

*In case of dry surface (shaft, plate forms, foundation) 30mm
*In case of occasionally wetted surface (top dome) 35mm
*In case of permanently wetted surface reinforcement dia up to 20mm 40mm
*Thickness of top dome 125mm
*Thickness of bottom dome 125mm
*Thickness of plate forms, landings 200mm
* Free board depth 300mm
*Minimum Dead storage depth 150mm
*Thickness of lean concrete below foundation 150mm
*Minimum depth of foundation excluding PPC 2000mm
*Age factor shall not be more than 1 (one)
*Minimum number of columns to be provided **10 (Ten)**

1.2 General RCC:

The aggregate & cement shall be mentioned by weight only. The mixing shall invariably be carried out in mechanical mean & in such a way so as to avoid any losses of water or cement. No hand mixed concrete is allowed. It conveyed, placed in position & compacted by suitable of mechanical vibrator, as rapidly as practicable but in no case the time of compaction over mixing shall increase 30 minutes, standby concrete mixer & vibrator shall be available at site.
The concrete shall be cured properly curing it moist constantly until end of three weeks from the date of casting.
Ordinary Portland cement (OPC Grade Conforming to IS: 269 marks shall only be used. Cement manufactured in mini plants shall not be used. All reinforcement used shall be of TOR BAR (**Fe 415**) ISI marked shall be clean & free from loose mill scales, rust & oil or other coating which may destroy or reduce bond. Minimum size of reinforcement bars shall be new or in good condition with out holes or dents, it has to be approved from Engineer in charge. The individual elements should be in good shape to ensure a gap free shuttering according to the drawings. The paint used shall have good base & shall not stick to the concrete surface. Suitable system have to provide or keeping the surface in place & keeping the correct distance in case of walls. Construction joints should be minimum & they have to be executed with most carefully continuing concreting the loose material has to be removed & they have to clean properly. Honey combing has to be avoided by suitable shuttering & proper of vibrators.

The water used for concreting shall be free from all undesirable salts & other impurities & shall be fit for concreting as per IS: 456-2000.

It is specifically being mentioned that the ground water available in this area may not be portable & not fit for concreting; therefore, transportation from nearby canal water source has to be made. For the purpose of concreting & curing only potable water is to be used. For this purpose contractor shall provide a diesel pump set with necessary piping arrangement to ensure proper curing.

The exposed surface of concreting shall be continuously in wet condition by pounding or covering with a layer of sack canvas, Hussein or similar materials kept continuously wet for at least 21 days from the date of placing of concrete.
Mixing of concrete.

Ingredients of concrete such as cement, coarse aggregate, fine aggregate and water are to be weighed and mixed by mechanical weight batcher cum mixer only No hand or volume based measurements of weight is allowed.

The Engineer in charge will make arrangement to check the functioning of machinery at site of work at least one day before the pouring of concrete.
Testing:

Material & workmanship shall come with the relevant specifications as described in subsequent clauses & in Rajasthan PWD (B&R) material or workman-ship not covered by the above specifications, shall cover with the relevant IS (with up to date amendments)

Acceptance of concrete: The concrete tested in accordance with Testing of concrete clause above, shall meet the criteria for acceptance of concrete as per IS 456. The strength of concrete shall be the average strength requirement for different grades of concrete. If the advance 7 days tests show crushing strength that are too low, corrective measures shall be taken at once, at the Engineer's directions without waiting for the result of the 28 days tests.

1.3 Failure to meet strength requirements :
In cases where concrete tested fails to meet the test requirement, the Engineer in charge shall have the right to require any one or all the following additional tests. The contractor at his own expense shall carry these out. The Engineer in charge shall be the final authority for interpreting the result & shall decide upon the acceptance or otherwise.

1. Curing & load testing of the concrete member concerned representative by the test, which failed.

2. Replacement of any such potions of the structure. No payment shall be made for the dismantling of the concrete, relevant form work, or reinforcement. The contractor at own expenses shall make embedded fixtures & reinforcement of adjoining structures damaged during dismantling well.

3. Extended curing of the structure of the concrete represented by the specimen.

4. Collecting & testing of a core specimen form the hardened concrete. The location, number & size of such specimen shall be taken as directed by the Engineer in charge.

5. Any other test i.e. ultrasonic &/or rebound hammer tests to be decided by the Engineer, at the contractor's own cost.

1.4 Check of reinforcement & concreting :

All reinforcement shall be got checked & recorded prior to pouring of concrete, by a representative of the Engineer in charge, not below the rank of Assistant Engineer. Similarly the entire concrete pouring work shall be done in the presence of an officer not below the rank of junior Engineer. The contractor shall therefore, give a notice of minimum three days to the Engineer in charge or his representative, such that the works can be checked by him or his representative.

1.5 Final Finishing

The contractor will ensure that the entire structure along with all its installation is in a finished & in new & fully operative condition when handed over. He shall have repaired & removed all signs of damage that might have been done during the course of installation & fixing of equipment. He shall also see that the entire exterior has been finished properly & excavated sill. This shall have to be done to the satisfaction of the Engineer in charge.

1.6 RCC Stair Case & ladder

90cm. wide stair case of RCC shall be provided from found to the level where sufficient headroom is available below balcony. Staircases will go around the circle inserting the columns. At ground & then at each column junction & then at top sufficient landing space is to be provided. Rise of step is to be kept 15 to 17.5cm. & trade around 22.5 to 22.0 cm. On stair 0.9m clear height railing consisting of vertical post of angle 50x50x6mm firmly grouted to full depth in concrete at center of each flight & initial & last point of each flight on landing of stairs (three Nos. on each landing & last point of each flight on landing of stairs (three Nos. on each landing & two Nos. on each flight) with GI 20mm medium class pipe in two rows at both side in full length of stairs is to be provided.

From last landing to balcony box type 0.60m wide MS fabricated ladder with steps & railing is to be provided & fixing in concreting of landing at bottom & extended beam slab beyond balcony. For fabrication of box type stair case 2 rows of MS angle section of 75x75x6mm on each side are to be welded by braces & in between the two steps by MS angle iron of 50x50x6mm & 6mm thick MS sheet are be to provided. At the bottom MS sheet 5mm thick is to be welded with the framed structure, Railing of MS angle 50x50x6mm. & 20mm GI pipe to be welded with the ladder.

From balcony to top of tank 0.45m wide MS box type ladder with railing/of above specification will be provided. The ladder is to be fixed in concrete of balcony & at this point width of balcony is to taken as 1.50m. in 2m length of balcony. At roof tope level landing is to be provided of

1x0.80m. by casting cantilever slab Railing around landing is to be connected with roof top railing.

Inside the tank 0.45m wide aluminium ladder from top of 1.5m depth is to be provided & than 0.60m wide RCC stair from this level to bottom dome is to be provided. This Ladder to be fixed at top of vertical wall and at bottom on dome (RCC stair having 0.15m rise & 0.22m trade of step)

1.7 Balcony & its railing.

Balcony 90cm. wide is to be provided at the junction of vertical conical wall of tank & at the point where MS box type ladder from balcony to top of tank is to be fixed, the width of balcony is to be taken as 1.5m in 2m length of balcony. 1.0m. height railing consisting of vertical posts of angle iron size 50x50x6mm firmly grouted to full depth in concrete at 1.5m apart with GI 20mm medium class in two rows around full length of balcony is to be provided.

1.8 Roof Railing

1.00m. high railing around the tank at roof top is to be provided comprising of MS angle 50x50x6mm. 1.0m. height above roof top 1.5m apart & firmly embedded in roof concrete 20mm GS tubes medium class in two rows are to be provided through the angle iron by making holes of suitable size in angle iron.

1.9 Ventilator.

1.2m dia & 0.60m high circular ventilator is to be provided at the top center of tank. Ventilator frame is to be provided comprising of two circular MS flat rings of 50x6mm at top & bottom with 12mm MS vertical bars placed @ 10cm. C/C duly welded to circular rings. Around his frame expanded metal size 20 to 25mm of 18 SWG is to be fixed by beading with flat of 20x6mm as first fold. Second fold of wire gauge 14 mesh x 24 gauges is to be wrapped around it. Top cover of RCC circular slab of 1.40m dia 7.5cm x 6mm flat ring of 1.4m dia having 8mm 15cm C/D mesh welded in it, is to be fabricated & then concreting of nominal mix M. 25 is to be provided.

1.10 Manhole covers.

60x60cm. manhole at top of tank is to be provide made of MS fabrication 75x75x6mm angle iron frame & 4 Nos. hold fast of 100mm length same size of angle iron are to be grouted well in concreting MS cover 5mm thick MS sheet two suitable hinges of 150mm length & locking arrangements is to be provided.

1.11 Lighting Arrestor :

Lightning arrestor of aluminum comprising of 2.0m long rod of 200mm dia with ball & 3 prongs to be provided at top & to be carried to ground by alluminium strip of 32mm x 6mm up to Earthing plate at 3.5m below GL Earthing with GI earth plate 600mm x 600mm x 6mm thick including accessories embedding by digging 3.5m. below GL & refilling with 8 alternate layers of salt, char coat & providing masonry enclosure with cover plate & watering GI pipe 50mm class B with funnel etc. as per ISS 3043 complete at required.

1.12 Water level indicator:

Water level indicator consisting of copper float of 0.45m diameter of barrel shape having 0.10m.- barrel length & covered at top & bottom with dome shape sheet. Thickness of sheet of 14 gauge, Iron counter weight & indicator is to be connected by sheet wire passing on alluminium pulley of not less than 100mm dia. Total 7 pulleys are to be provided. Indicator is to be provided at 4 to 6m above ground level. It is to be made out to of MS sheet 3mm fixed over wooden plank 20mm with angle iron frame of 35x35x5mm & painted with white base & letters in block & red marking with fluorescent paint & line at 10cm. interval is required.

1.13 Mesh or outlet pipe.

On the flange of delivery pipe & wash out pipe in the tank mesh made out of copper rod of 8mm dia 5cm. C/C welded to copper circular frame of size 50mm x 5mm equal to diameter of flange, so that this mesh can be fixed by providing nut bolts on the mouth of delivery pipes.

1.14 Stair Door

One steel door with frame & single leaf shutter of size 0.90cmx 1.80m is to be provided & fixing with the column at the starting of 2^{nd} and 3^{rd} flight of RCC stair case. Angle iron frame of size 50x50x6mm all round the shutter along with fixing locking arrangements is required MS shutter of 16 SWG braces is to be provided.

1.15 Pipe clamp

Fixing inlet, outlet overflow, & washout puddle collar & pipes shall be done by the contractor from to ground level then duck foot & then horizontally upto outside tank raft & then fixing of sluice valve, The contractor will provide there CI D/F pipes, sluice valves etc. The CI D/F specials, Rubber sheet, Nut bolts shall be supplied by the contractor. However it is mandatory for contractor to use CI D/F specials & pipes available in division store at the rates prescribed in Para no. 6 to B-4 of the tender document. All nuts & bolts (galvanized) & rubber sheet shall be provided by contractor.

Necessary clamps to fix the pipe with columns shall be made out of MS flat 75x6mm size two in each column height between two braces shall be provided by contractor. Galvanized nut bolts are to be provided in each clamp, which shall be supplied by the contractor at his own cost as per enclosed drawings.

1.17 Slogan & Logo

The contractor shall paint a area of 6mx3m on the vertical wall of the tank portion by using 3 coats of plastic emulsion pain of shade as approved by the Engineer in charge to from a based for writing the slogan & logo of PHED. For writing the slogan the letters shall be of 30cm. size. The size of logo shall be 75cm. The shade for painting the slogan will be approved & directed by Engineer in charge. The capacity of OHSR should be painted as per Engineer charge in surface area of 10 sqm.

1.18 Plinth protection:

This also includes construction of plinth protection work around OHSR after fixing vertical & horizontal CI pipes & testing of pipe line at full tank level. For plinth protection, 0.36m wide circular brick masonry wall in 1:6 cement mortar having inside diameter of foundation raft plus 1.00m. The depth of wall is to be taken as 1.00m and below it 0.45m wide 0.10m thick CC 1:5:10 is to be provided. Thus total height of wall will be 1.30m. Top of wall and outer surface up to 0.60m depth is to be plastered by cement mortar 1:4 of 20mm thick in 2 layers. Then the excavated earth should be filled in layers by ramming and watering inside the circular wall covering whole of the pipe and foundation. Over the filled up earth CC 1:5:10 of 7.50cm thickness is to be provided in the entire area. Over it CC flooring 1:2:4 mix M10 grade 150mm thick is to be done. The whole of the top surface should be finished by concrete slurry periphery is to be given so that rain water does not accumulate.

Plinth protection work is to be constructed below the over head service reservoir it shall be extended 1m from fall of balcony or edge of raft slab. Which ever is more all around service reservoir, it shall consist of laying cement concrete 150mm thick in M 10 over compacted soil.

1.19 Painting

It not otherwise stated metallic surfaces shall receive one initial cost at the manufacturer's workshop. After arrival of the equipment on site the same shall be inspected and damaged

portion shall be cleaned and given the primer and under coat of similar paint. After erection all metal work shall be painted as follows.

Painting of metallic surfaces and water proof cement paint on complete structure.

All mild steel railing, gate frame, MS ladders.	Primer of red oxide, tow under coats and one finishing coat of approved enamel paint and of approved shades.
Complete RCC structure	Water proofing cement paint of approved shades in two or more coats upto fine finish.

Recommended makes of paints:-

ICI Ltd, Johnson and Nicholson Ltd, Asian paint Ltd, Godless nerolac, Ltd. Shalimar

2. Testing of Water tightness:

The contractor shall carry out a water tightness test for the maximum water head condition such that with the water standing at full supply level. All cost of testing shall be borne by the contractor. This test shall be carried out in accordance with the procedure given below:

a. For water tightness test :
   i. Before the filling operation are started the reservoir shall be jointly inspected by the Engineer in charge and the representative of the contractor and condition of surfaces of wall, construction joints etc. shall be inspected and noted and it shall be insured that jointing material filled in the joints is in position & all opening are closed. The contractor shall make necessary arrangement for ventilation and lighting of reservoir by way of flood lights Circulators etc. for carrying out proper inspection of surfaces and internal conditions if so desired by the Engineer in charge
b. The Structure shall be filled with water gradually at the rate not exceeding 1m. water level per hour and shall extended for a period of 75 hours. Records of leakages at different level of water in the reservoirs, if any shall be kept.
c. The reservoir once filled shall be allowed to remain filled for a period of 7 days before any drop in water level is recorded again 7 days. The total drop in surface level over a period of 7 days shall be taken as indication of the water tightness of the reservoir are practical purposes shall not exceed 40mm. There shall be no indication of leakage around the puddle collars or on the wall and bottom of the reservoir.
d. If the test not satisfy the test requirements and the daily drop in 7 days and if the specified exceeded, the structure may be considered as satisfactory.
e. In case water level exceed the permissible limit with the stipulated of contractor shall carry out such additional work and adopt such measures advised by the Engineer in charge to reduce the leakage in the permissible limit. The rectification work shall be carried out in this condition shall be at least.

   It the test result satisfactory, the contractor shall ascertain the cause & make all necessary repeated water retaining structure test procedures, at his own cost. The test shall be un satisfactory after the repairs, the structure shall be condemned & it will dismantle & reconstruct the structure, the original specification all concrete block M-20 should be cast under duck foot bend & horizontal pipes of suitable size.

3 .TEST FOR SEEPAGE LOOES OF THE RESERVOIRS

The reservoirs shall be tested for seepage losses under reservoir full conditions. Total losses shall be determined by observations of water level with no inflow. Evaporation losses at the site shall be determined for different seasons. Deducting the evaporation losses from the total losses, the seepage losses shall be determined. **The seepage losses shall not exceed 0.6 cusecs/million sqm. (2 cusecs/Msft of the wetted area)** The contractor shall have to adopt remedial measures as instructed by the Engineer in charge in case the seepage losses exceed this limit for which the entire cost shall be borne by him. The seepage losses exceeding the prescribed limit shall not be acceptable in any case.

SPECIFICATIONS FOR PIPELINE LAYING

1.0 GENERAL STANDARDS

Except as otherwise specified in this technical specification, the Indian/International Standards and Codes of Practice in their latest version shall be adhered to for the design, manufacturing, inspection, factory testing, packing, handling and transportation of product. The work of laying; jointing; testing and commissioning shall also be as per the relevant Indian standards. Should any product be offered conforming to other standards, the equipment or products shall be equal to or superior to those specified and the documentary confirmation shall be submitted for the prior approval of the Engineer-in-Charge.

If any provision is prescribed in more than one Indian Standards, the specification more stringent shall be used for the work.

The use of different types of pipe material in the contract shall be in accordance to the provisions given in the "scope of work" and the principals defined therein.

1.1 SPECIFICATIONS OF MATERIALS

Standards

Except as otherwise specified in these specifications, the Indian/International Standards and Codes of Practice in their latest version shall be adhered to for the design, manufacturing, inspection, factory testing, packing, handling and transportation of product. Should any product be offered conforming to other standards, the equipment or products shall be equal to or superior to those specified and the documentary confirmation shall be submitted for the prior approval of the Engineer.

This specification requires a reference to the following standard specifications

uPVC PIPES	
IS: 4985	Unplasticised PVC pipes for potable water supplies
IS: 12235	Methods of tests for Unplasticised PVC pipes for potable water supplies
IS: 7634	Code Of Practice For Laying & Jointing Of uPVC Pipes
CPHEEO	Manual on Water Supply and Treatment, III edition, Ministry of Urban Development, New Delhi- May 1999.
IS: 1239	Mild steel tubes, tubular and other wrought steel fittings
IS: 778	Specifications for copper alloy gate, globe and check valves for water works purposes
IS: 14846	Sluice valve for water works purposes (50 to 1200 mm)
IS: 1387	General requirements for the supply of metallurgical material
IS: 1367	Technical supply conditions for threaded steel fasteners
IS: 318	Leaded tin bronze ingots and casting
IS: 779	Water meters
IS: 3624	Pressure and vacuum gauges
IS: 5382	Rubber sealing rings for gas mains, water mains and sewers
IS: 12820	Dimensional requirements for rubber gaskets for mechanical joints and push on joint for use with cast iron pies and fittings for carrying water, gas and sewage.
IS: 3400	Methods of test for vulcanised rubber (part-1 to 22)
IS: 9862	Ready mixed paint, brushing, bituminous, black, lead free, acid, alkali, water and chlorine resisting
MTNL	Mahanagar Telephone Nigam Limited; Technical specifications for cable ducts.
IS: 10500	Drinking water specification
IS: 341	Black japan, types A, B and C

	CAST IRON PIPES AND SPECIALS
IS: 1536	Specification for Centrifugally Cast (Spun) Iron Pressure Pipes for Water, Gas and Sewage
IS: 1538	Specification for Cast Iron Fittings for Pressure Pipes for Water, Gas and Sewage
IS: 11606	Methods for Sampling of Cast Iron Pipes and Fittings
IS: 3114	Code of Practice for Laying of CI Pipes
IS : 630	Rubber Insertion Sheet for flanged joints
IS : 1363	Nut, Bolts for joints

The principal items of the works to be carried out under these specifications are:

1. Providing, supplying, transporting, laying, jointing, testing and commissioning of **uPVC pipes** in respective reaches including fittings and specials as per design and as specified.
   - The inner diameters shall mean finished inner dia after accounting for pipe shell thickness.
   - The diameter of Filter Water Mains (for respective optional material uPVC) is as per the hydraulic calculations done by Department. The same may need to be increased to satisfy the hydraulic requirement, in case of change in trunk main length and/or shift in levels, if any, during execution.
   - Payments for pipeline works shall be as per actual length of pipe lines. Above lengths are as per Departmental survey, which may vary at the time of execution.
   - The thicknesses of uPVC Pipes shall be as per post award designs fulfilling the specifications and laid down criteria in this chapter.
   - **Acceptable Standards for Pipes :**

SN	Pipe Material	Standard for Pipe	Standard for Laying & Jointing
1	uPVC	IS 4985, 7634 (Part I)	IS 4985, 7634 (Part 1 to 3)

Note : The latest versions will be applicable for all the Standards.

1.2 uPVC Pipeline (class-4/ class-3)

The contract shall be covering supply and delivering of Unplasticized PVC pipes, socket & spigot type (of minimum working pressure rating of 6 kg/cm^2 for class-3 and 8kg/cm^{2}for class-4) along with elastomeric sealing ring (EPDM rubber) joint bearing ISI mark as per relevant Indian standards. The manufacturer of the rubber rings must have BIS license for manufacturing the rubber rings. Bell ended pipes shall not be acceptable.

1.3 Specials and Fittings

Cast Iron Fittings And Specials

This Specification covers the requirements for manufacturing, supplying, laying, jointing and, testing at works site, of Centrifugally Cast Iron pipes (Spun Iron pipes) used for water supply, sewerage and storm water drains.

Applicable Codes

The laying of CI pipes and fittings / specials shall comply with all currently applicable statutes, regulations, standards and Codes. In particular, the following standards, unless otherwise specified herein, shall be referred. In all cases, the latest revision of the standards / Codes shall be referred to. If requirements of this Specification conflicts with the requirements of the standards / Codes, this Specification shall govern. Others I.S. Codes not specifically mentioned but pertaining to the use of CI pipes form part of these Specifications.

Specials and fittings

CI specials and fittings used for CI pipes shall conform to IS: 1538. The methods for sampling of CI pipes and fittings shall conform to IS: 11606.

Dimensions and tolerances

The dimensions of pipes, sockets, spigots and flanges and their tolerances shall conform to the sizes specified in relevant clause of IS: 1536.

1.4 MS Pipe line

MS pipes shall be used for Suction & Delivery piping for pumps etc at pumping stations. After

approval of Engineer in Charge where use of the specified pipe material along the alignment is not otherwise feasible/suitable. MS pipes shall also be used for manufacturing of MS specials.

SPECIFICATIONS

The MS pipe shall be fabricated out of steel plates or strips of fresh mild steel coils (HR coils/HR plates) conforming to IS-2062 , and having minimum specified tensile strength of 410 MPa. MS pipes shall be of grade 410, longitudinally or spirally welded / ERW pipes, having butt-welded joints with beveled ends, as per IS 3589.The electrode shall be conforming to IS 814.The random length of MS pipes shall be 6 meters or more. The thickness of MS pipes used shall be adequate to sustain field test pressure but shall not be less than the 5 mm.

The MS pipes and specials used in the pump houses and CWRs shall have food grade epoxy coating with primer on the inside surface and fibre-glass bituminous coating on the outer surface, as per specifications. In case of pipes and specials used inside the CWR, the outer coating of approved primer and Epoxy paint shall be done. Manufacturing of MS pipes shall be done in conformity with IS: 3589 subject to following:

The end of MS pipes, short pipes shall have beveled end for welding.

MANUFACTURING PROCESS SHALL ENSURE THAT –

A. Base material i.e. HR coils/ HR Plates shall be of required quality.
   1. Production equipment is well designed.
   2. Quality control is comprehensive.

TESTING

The pipes shall be tested to the following requirements:

1. Visual inspection of all pipes from inside and outside for permissible tolerances as per IS: 3589.
2. Each pipe shall be hydraulically tested at the manufacturer's works to a test pressure as mentioned in IS: 3589.

MARKING

Each pipe shall be legibly marked as per IS 3589 which shall read as PHED – O.D. – Pipe thickness – designation.

QUALITY ASSURANCE

During the whole process of manufacturing, department's representative shall be present to supervise the Quality Assurance process and witness the test performed.

FABRICATION OF MS SPECIALS & FITTINGS

GENERAL

MS specials shall only be used where the field conditions does not permit use of CI/DI / uPVC specials. The MS specials shall be used after obtaining required approval from Engineer in Charge.

Unless and otherwise mentioned in the para below, the dimensions of all MS specials and fittings (bends, tees, scour tee, reducers, enlargers, etc.) shall in general confirm to the principals of IS: 7322. The specials (other than tapers and flanges) shall be fabricated from the MS pipes manufactured confirming to IS 3589. The thickness of MS pipes used for manufacturing of specials shall be adequate to sustain field test pressure but shall not be less than the 5 mm.

The Contractor shall submit the detailed drawing for each special to be used in the pipeline. On approval of the same by the Engineer-in-Charge, the Contractor will take up the manufacturing.

Tolerance for steel fittings shall confirm to the requirements of IS: 7322

FLANGED BRANCHES

Flanged branches shall be fabricated in accordance with the general specification and to the Engineer-in-Charge's requirement.

All the flanges shall be machined to standard thickness, square to the axis of the pipe.

BENDS

Bends to provide change of alignment in pipe laying shall be manufactured to suit the site conditions. As far as possible, bends of more than 45º shall not be provided. Bends shall be manufactured from tested pipes by angle cutting of the barrel or by such other standard procedure and re-welding. Bends shall be lined internally and coated externally as specified for the pipes.

a) Bends shall be fabricated taking into account the vertical and horizontal angles for each case.
b) The bends shall have welded joints and the upstream and downstream ends of each bend shall have a straight piece of variable lengths as required.
c) Bends shall be designed with deflection angle not more than 10 deg. between two segments.

d) When the point of intersection of a horizontal angle coincides with that of a vertical angle, or when these points can be made to coincide, a single combined or compound bend shall be used.

TAPERS

Tapers shall be manufactured out of steel plates. The tapers shall be suitable for connections to the sluice valves or flanged tailpiece on one side and to MS pipe on the other side.

MS FLANGES

The nominal size and thickness of the MS flanges as defined for plate flanges of required pressure rating confirming to IS 6392 shall be used in accordance to the design pressure at the place of installations. Nominal Size of flange shall be in conformity to the equipment or pipe appurtenance with which they are to be used. The flange drilling shall conform to IS 1538 for flanges upto 1500 mm ID.

WALKWAYS, STAIRS, LADDERS, HAND RAILS ETC.

Walkways, stairs, rungs, ladders, hand rails, etc. wherever necessary shall be provided as per the directions of Engineer-in-Charge. These shall conform to well establish good engineering practices.

1.5 TRANSPORTATION / STORAGE OF PIPES AND SPECIALS:

The Contractor has to transport the pipes and other materials from manufacturer to the site stores and from the site stores to the site of laying as per the instructions given by the Engineer in Charge. Pipes should be handled with care to avoid damage to the surface and the socket and spigot ends, deformation or bending. Pipes shall not be dragged along the ground or the loading bed of a vehicle. Pipes shall be transported on flat bed vehicles/trailers. The bed shall be smooth and free from any sharp objects. The pipes shall rests uniformly on the vehicle bed in their entire length during transportation. Pipes shall be loaded and un-loaded manually or by suitable mechanical means without causing any damage to the stacked pipes.

Socket and Spigoted pipes should be stacked in layer with sockets placed in alternate ends of the stack to avoid lop sided stacks.

Pipes should not be stored inside another pipe. On no account the pipes should be stored in stressed or bent condition or near the sources of heat. Pipes should not be stacked more than 1.5 m high and pipes of different sizes and classes should be stacked separately. The ends of the pipes should be protected from abrasion. The pipes should be protected from U.V. rays and excessive heat at all times. Their storage facility should be well ventilated.

The Contractor shall provide proper and adequate storage facilities to protect all the materials and equipments against damage from any cause whatsoever and in case of any such damage/theft, the Contractor shall be held responsible.

The contractor will lay the pipelines along the alignments as per the approved L section. Layout shall be given by the Engineer in Charge of his authorized representative. The layout shall be given keeping in view the information available regarding existing services like water lines, sewers, telephone and electric lines/ cables. In the event some services fall in the alignment of lines to be laid, the contractor shall have to shift the alignment or such services. The contractor shall take all due care to avoid damage to any such services and, in case of any damage occurring to them in progressing the work, the Contractor shall make good the same at his own cost. No additional time and payment shall be allowed on this account.

Rubber rings shall be handled and stored in their original packing, protected against sunlight and contacts with petroleum product, solvents and paints.

The Contractor shall provide suitable lifting equipment for loading, unloading and laying of the pipes.

1.6 SPECIFICATIONS FOR LAYING AND JOINTING OF PIPE LINE

1.6.1 GENERAL

The contractor will inspect the route along which the pipeline is proposed to be laid. The pipe alignment is duly marked on the field by demarcation pillars. However efforts shall be made by the contractor to make minor deviations from the marked alignment so as to keep the pipe alignment as straight as possible and to avoid damage of public and private properties along the alignment. The alignment of pipe line and location of specials & chambers may be changed at site in co-ordination and with prior approval of the Engineer In Charge. The final alignment on which the pipeline shall be laid shall be marked in field and got approved from the Engineer in Charge or his representative.

1.6.2 STANDARDS

Except otherwise specified in this technical specification, the Indian Standards and Codes of Practice in their latest version, National Building code, PWD specification of the state of Rajasthan and Manual of water supply of GOI shall be adhered to for the supply, handling, laying, installation, and site testing of all material and works. The laying of pipeline shall be done in confirmations to the IS 7634 for uPVC pipes.

1.6.3 ALIGNMENT AND THE L-SECTIONS

Pipes shall be laid along the alignment given by the department, after the approval of L section. The gradient in which the pipe alignment shall be approved will be based on the following principles:
On average, the change in slopes per km. length shall not be more than 10 in number.
In case of uPVC pipes, the pipes shall have a minimum cover of 1.0 m when laid under roads with light traffic or under cultivated soils and 1.25 m when laid under roads with heavy traffic.

1.7 EARTH WORK

1.7.1 GENERAL

The earth work shall be carried out as specified above.
Before excavating the trench the alignment of pipeline and L-section shall be approved by Engineer-in-Charge. The work of trench excavation should be commensurate with laying and jointing of the pipeline. It should not be dug in advance for a length greater than 3 days ahead of work of laying and jointing of pipeline unless otherwise directed by the Engineer-in-Charge. It is proposed to ensure the following:

(i) Safety precautions have to be incorporated in the work process
(ii) Hindrances to the public have to be minimized
(iii) The trench shall not be allowed to erode
(iv) The trench must not be filled with water
(v) The trench must not be refilled before laying of the pipes

The bed for the laying of the pipes has to be prepared according to the L-Section immediately before laying of the pipes.
The excavation shall be carried out to correct lines and levels. This shall also include, where required, proper shoring to maintain excavations and also the furnishing, erecting and maintaining of substantial barricades around excavated areas and warning lamps at night.
Excavated material shall be dumped in regular heaps, bunds, riprap with regular slopes within the lead specified and leveling the same so as to provide natural drainage. Rock/soil excavated shall be stacked properly as approved by the Engineer in Charge. As a rule, all softer material shall be laid along the center of heaps, the harder and more weather resisting materials forming the casing on the sides and the top. Rock shall be stacked separately.
Topsoil shall be stock piled separately for later re-use.

1.7.2 CLEARING

The area to be excavated / filled shall be cleared of fences, trees, plants, logs, stumps, bush, vegetation, rubbish, slush, etc. and other objectionable matter. If any roots or stumps of trees are encountered during excavation, they shall also be removed. The material so removed shall be disposed off as approved by the Engineer in Charge. Where earth fill is intended, the area shall be stripped of all loose/ soft patches, top soil containing objectionable matter/ materials before fill commences.

1.7.3 EXCAVATION

The trench excavation of pipe line shall be in accordance with IS 7634 for uPVC pipes or as per the general provisions given above. Pipe trenches shall be excavated to the lines and levels approved by the Engineer in Charge. The width of the trench at bottom between the faces of sheeting shall be such as to provide minimum 200 mm clearance on both sides of the pipe. No pipe shall be laid in a trench until the section of trench in which the pipe is to be laid has been approved by the Engineer in Charge. The walls of the trench shall be cut to stable side slopes preferably to a slope of 1(h) : 4 (v) or 1(h) : 2(V) depending on the nature of soil.
The bottom of the trench shall be trimmed and leveled to permit even bedding of the pipes. It should be free from all extraneous matter which may damage the pipe or the pipe coating. Additional excavation shall be made at the joints of the pipes, so that the pipe is supported along its entire length.

For trench bottom with boulders or rock, sand bedding as per details detailed herein after shall be provided.

All excavated material shall be stacked in such a distance from the trench edge that it will not endanger the work or workmen and it will avoid obstructing footpaths, roads and drive ways. Hydrants under pressure, surface boxes, fire or other utility controls shall be left unobstructed and accessible during the construction work. Gutters shall be kept clear or other satisfactory provisions made for street drainage, and natural water-courses shall not be obstructed.

To protect persons from injury and to avoid damage to property, adequate barricades, construction signs, torches, red lanterns and guards, as required and as specified above, shall be placed and maintained during the progress of the work and until it is safe for traffic to use the roadways. All materials and pipes which may serve as obstruction to traffic shall be enclosed by fences or barricades and shall be protected by illuminating proper lights when the visibility is poor.

As far as possible, the pipe line shall be laid below existing services, like water pipes, cables, cable ducts and drains but not below sewers, which are usually laid at greater depth. Where it is unavoidable, pipe line should be suitably protected. A minimum clearance of 150 mm shall be provided between the pipe line and such other services.

Trees, shrubbery fences, poles, and all other property and surface structures shall be protected. Tree roots shall be cut within a distance of 50 cm from pipe joints in order to prevent roots from entering them. Temporary support, adequate protection and maintenance of all under ground and surface structures, drains, sewers and other obstructions encountered in the progress of the work shall be provided. The structures, which will be disturbed, shall be restored after completion of the work.

Where water accumulates in any trench the Contractor shall maintain the trench free of water during pipe laying.

Wherever necessary to prevent caving, trench excavations in soils such as sand, gravel and sandy soil shall be adequately sheeted and braced. Where sheeting and bracing are used, the net trench width after sheeting shall not be less than that specified above. The sides of the excavation shall be adequately supported at all times and except where described as permitted under the Contract, shall be not battered.

The Engineer in Charge in co-operation with the Contractor shall decide about the sheeting/ bracing of the trench according to the soil conditions in a particular stretch and taking into account the safety requirements of the Contractor's and Engineer- In- Charge's staff. Generally, safety measures against caving have to be provided for trenches with vertical walls if they are deeper than 2.0 m in sandy or loose formations.

1.7.4 TRENCH EXCAVATION TO COMMENSURATE WITH THE LAYING PROGRESS

The work of trench excavation should be commensurate with laying and jointing of the pipe line. It should not be dug in advance for a length greater than 500m ahead of work of laying and jointing of pipeline unless otherwise permitted by the Engineer in Charge. The Contractor has to ensure the following:

(i) safety protections as mentioned above have to be incorporated in the work process
(ii) hindrances to the public have to be minimized
(iii) the trench must not be eroded before the pipes are laid
(iv) the trench must not be filled with water when the pipes are laid
(v) the trench must not be refilled before laying of the pipes

The bed for the laying of the pipes has to be prepared to the pipe grades so that uniform support is assured for the full length of the pipe.

1.7.5 BEDDING OF THE PIPES

The trench bottom shall be even compact and smooth so as to provide a proper support for the pipe over its entire length, and shall be free from stones, lumps, roots and other hard objects that may injure the pipe or coating. Holes shall be dug in the trench bottom to accommodate sockets so as to ensure continuous contact between the trench and the entire pipe barrel between socket holes.

Adequate soil cushion of minimum 20 cm depth shall be provided under the pipes if the strata, on which the pipes are laid, are rocky. The soil used for cushion should be free from stones, lumps and other hard objects that may injure the pipes or their coating.

1.7.6 LAYING & JOINTING OF UPVC PIPES

Pipes should be lowered into the trench manually suitable for the weight of pipes. For larger sizes, more than 200 mm nominal size, the pipe may be lowered by the use of ropes. All construction debris should be cleared from the inside of the pipe either before or just after a joint is made. This is done by passing a pull-through in the pipe, or by hand, depending on the size of the pipe. All persons should vacate any section of trench into which the pipe is being lowered

On gradients of 1:15 or steeper, precautions should be taken to ensure that the spigot of the pipe being laid does not move into or out of the socket of the laid pipe during the jointing operations. As soon as the joint assembly has been completed, the pipe should be held firmly in position while the trench is back filled over the barrel of the pipe.

The designed anchorage shall be provided to resist the thrusts developed by internal pressure at bends, tees, etc.

The assembly of the pipes shall be made as recommended by the pipe manufacturer and using the suitable tools.

The socket and spigot ends of the pipes shall be brushed and cleaned. The chamfered surface and the end of the spigot end have to be coated with a suitable lubricant recommended by the manufacturer of the pipes. Oil, petroleum bound oils, grease or other material which may damage the rubber gasket shall not be used as lubricant. The rubber gasket shall be inserted into the cleaned groove of the socket. It has to be checked for correct positioning.

The two pipes shall be aligned properly in the pipe trench and the spigot end shall be pushed axially into the socket either manually or with a suitable tool specially designed for the assembly of pipes and as recommended by the manufacturer. The spigot has to be inserted up to the insertion mark on the pipe spigot. After insertion, the correct position of the socket has to be tested with a feeler blade.

Deflection of the pipes -if any- shall be made only after they have fully been assembled. The deflection shall not exceed 75 % of the values indicated by the pipe manufacturer.

1.7.7 LAYING & JOINTING OF AC PIPES

Laying

The pipes shall be lowered into the trenches either by hand passing or by means of two ropes. One end of each rope shall be tide to a wooden or steel peg driven into the ground and the other end shall be held by men which when slowly released will lower the pipe into the trench.

Some clayey soils for example, black cotton soil are drastically affected by extremes of saturation and dryness. In such areas, the engineer should establish whether the condition exists to a degree justifying special precautions. It is recommended that in such cases an envelope of a minimum 100mm of tamped sand shall be made around the pipeline to avoid any bonding. The laying of pipeline shall be as per IS 6530 – 1972 (amended up to date).

For uPVC pipes, cushion of fine earth or sand shall be provided for a depth of 150mm by excavating extra depth of the trench if necessary and the pipes laid over the cushion.

Jointing

Asbestos Cement Coupling Joints

This joint shall consist of three rubber rings and an asbestos cement coupling machined on the inside. The rubber ring shall be sealed in their respective grooves, after cleaning the coupling and rubber rings. The machined ends of the pipe and end rings in the coupling shall be suitably lubricated with a soft soap solution or other lubricant which is not detrimental to rubber rings or drinking water. Then, the assembly shall be made by pushing with a crow-bar or using a pipe puller. The joints shall be made by keeping the pipes in one line. Any permissible deflection at the joint shall be made after completion of joint only. Wherever necessary, change over from CI/DI to Asbestos cement pipe and vice versa shall be done with the help of suitable adopters.

The assembled joint shall be flexible and capable of withstanding, the specified hydraulic pressure (IS 1592) of pipes on which they are to be used when the pipes are set at the maximum permissible angular deviation indicated by the manufacturer of pipe. Half percent (0.5%) joints subject to minimum two nos. joints shall be tested as per provisions of IS 1592.

Cast Iron Detachable Joints

The joint shall consist of a central collar, two rubber rings, two flanges of cast iron and the required number of bolts and nuts. One flange and rubber ring shall be placed on end of the pipe already laid, and the other flange, rings and central collar shall be slipped on to the pipe to be assembled. The rubber ring shall be kept positioned at half the collar width less 2.5mm from the end of the pipe already laid. The rubber ring shall be brought nearer leaving a gap of 5 mm between the two pipe ends. This gap will facilitate manoeuvring of deflection at joints after assembly and will take care of an expansion in the pipeline. The collar shall be slided to sit square around the rubber ring on pipe 1, and then the rubber ring shall be rolled on pipe 2 to sit around the collar. The flanges shall be moved on both ends to enclose rubber rings. The fastening bolts shall be inserted through the holes of the flanges and the bolts shall be tightened and evenly for proper sitting of the joint.

Socket and spigot jointing: The surfaces to be glued are thoroughly scoured with dry cloth and preferable chamfered to 30^0. If the pipes have become heavily contaminated by grease or oil, methylene cement is applied with a brush evenly to the outside surface of the spigot on one pipe and to the inside of the socket on the other. The spigot is then inserted immediately in the socket up to the shoulder and thereafter a quarter (90^0) turn is given to evenly distribute the cement over the treated surface. The excess cement which is pushed out of the socket must be removed at once with a clear cloth. Jointing must be carried out in minimum possible time, time of making complete joint nit being more then one minute, joints should not be disturbed for at least 5 minutes. Half strength is attained in 30 minute and full in 24 hours.

1.7.8 DEWATERING

The Contractor shall ensure that the excavation and the structures are free from water during construction and shall take all necessary precautions and measures to exclude ground/rain water so as to enable the works to be carried out in reasonably dry conditions in accordance with the construction program. Sumps made for dewatering must be kept clear of the excavations/trenches required for further work. The method of pumping shall be approved by Engineer in Charge, but in any case, the pumping arrangement shall be such that there shall be no movement of subsoil or blowing in due to differential head of water during pumping. Pumping arrangements shall be adequate to ensure no delays in construction. The dewatering shall be continued for at least (7) seven days after the last pour of the concrete. The Contractor shall, however, ensure that no damage to the structure results on stopping of dewatering.

1.7.9 Back filling of the pipe trench

Immediately after laying and jointing of the pipes the trench shall be back filled for protection of the pipes. If leakages occur in a completely covered pipe the contractor has to open and refill the trench again at his own risk and cost.

All excavation shall be back filled to the level of the original ground surfaces unless otherwise shown on the drawings or ordered by the Engineer in charge and in accordance with the requirements of the specifications. The material used for backfill, the amount thereof and the manner of depositing and compacting the earth shall be subject to the approval of the Engineer in charge but the contractor will be held responsible for any displacement of pipes or other structures any damage to their surfaces or coating or any instability of pipes and structures caused by improper placing and completion of backfill materials. The contractor shall not use unsuitable soil for backfilling.

The trench shall be refilled with selected approved material free from stones from the excavation put into place by hand besides and around the pipe and up to 25 cm above the top of the barrel of the pipes in layers of 10 cm. After compaction, during compaction around the pipe the pipe or its coating must not be damaged. Subsequent refilling shall be placed at consolidated in 15 cm. Layers after compaction and carried to the level necessary to allow for the temporary restoration of road and path surfaces and also for hard core (if and where ordered) on roads or to such level as will have the requisite space for the top soil, road surface etc. to be reinstalled as directed by the Engineer in charge.

Trenches in the right of way of a road shall be backfilled with selected material placed in layers not exceeding 10 cm. in thickness after completion. Any deficiency in the quantity of material for backfilled the trenches shall be recouped by the contractor at his own expenses.

The contractor shall at his own expenses make good any settlement of the trench backfill accruing after backfilling and until the expiry of the defects liability period.

1.8 TESTING OF THE PIPELINES

1.8.1 SECTIONAL TESTS OF UPVC PIPE LINE

After laying and jointing, the pipeline shall be tested for tightness of barrels and joints, and stability of thrust blocks in sections approved by the Engineer in Charge. The length of the sections depends on the topographical conditions. Preferably the pipeline stretches to be tested shall be between two chambers (air valve, scour valve, bifurcation, and other chamber).

The water required for testing shall be arranged by the contractor himself. The Contractor shall fill the pipe and compensate the leakage during testing. The Contractor shall provide and maintain all requisite facilities, instruments, etc. for the field testing of the pipelines. The field testing pressures for pipelines & duration of test shall be follows:

S.No	PIPE MATERIAL	TEST PRESSURE	TEST DURATION
1.	uPVC	1.5 times the design working Pressure i.e. at 9 kg/sq.cm. for class-3 and 12 kg/sq.cm. for class-4	6 Hours (Pipe to be filled for 24 hours before testing)

Acceptance Criteria for uPVC pipes shall be that the required addition of water to maintain pressure is not more than

Q = 4.5 liter per 1.6 Km per 25 mm of pipe diameter per 30 m test pressure for 24 Hours

The sectional tests shall be accepted if the quantity of water required to be added to maintain test pressure during test duration is less than mentioned above in case of uPVC pipeline.

No section of the pipe work shall be accepted by the Engineer in Charge until all requirements of the test have been obtained.

On completion of a satisfactory test any temporary anchor blocks shall be broken out and stop ends removed. Backfilling of the pipeline trench shall be completed. After sectional testing, it will be the responsibility of the contractor that the pipelines be filled with water upto commissioning of the system.

1.8.2 SECTIONAL TESTS OF AC PIPE LINE

It is recommended to test the portions of the line by subjecting to pressure test as per table, as the laying progresses before the entire line is completed. Usually the length of the section to be tested shall not exceed 500m. The pipes shall be tested as specified in IS : 5913 in the factory and hence, the purpose of field testing is to check the quality of workmanship and also to check whether the pipes have been damaged in transit. As such, the test pressure shall be kept as 11.25 kg/Sq cm for class 15 pipes, unless a higher test pressure is specified. However, it may be noted that, the test pressure during the field test shall not exceed the values below.

Test Pressure for Pipes

Class of pipe	Maximum Field Test Pressure (kg/Sq cm)
15	11.25

Asbestos cement pipes always absorb a certain amount of water. Therefore, after the line is filled, it should be allowed to stand for 24 h, before pressure resting and the line shall again filled. The test pressure shall be gradually raised at the rate of approximately one kg/cm2/min. The duration of the test period if not specified shall be sufficient to make a careful check on the pipe line section.

The pipeline stretch will pass the test if the water added during the test period is not exceeding the admissible limit of 1 litre per Km per 10mm of pipe diameter per 30 m test pressure per day. No section of the pipework shall be accepted by the Engineer in charge until all requirements of the test have been obtained.

On completion of a satisfactory test any temporary anchor blocks shall be broken out and stop ends

removed. Backfilling of the pipeline shall be completed.

1.8.2 FAILURE TO PASS THE TEST

All pipes or joints which are proved to be in any way defective shall be replaced or remade and re-tested as often as may be necessary until a satisfactory test shall have been obtained. Any work which fails or is proved by test to be unsatisfactory in any way shall be redone by the Contractor.

1.9 ANCILLARY WORKS

1.9.1 ROAD / RIVER / NALLAH CROSSINGS

The road crossings shall be done in such a fashion that no joint comes under the carriage way and shoulders. The cover below the road surface should be minimum 0.90 meters otherwise suitably designed concrete encasing in M20 grade of concrete shall be provided. The river and nallha crossings shall be done by placing pipe below ground level, anchoring the pipe in base rock (if available) and thereafter providing suitably designed anchor blocks.

1.9.2 FLUSHING AND DISINFECTING OF PIPELINES

The pipeline shall be disinfected before commissioning for use. After testing the main, it shall be flushed with water of sufficient velocity to remove all dirt and other foreign materials. When this process has been completed, disinfection (using liquid chlorine, sodium or calcium hypochlorite) shall be done per the procedure approved by Engineer in Charge, in accordance to the standards prescribed in the codes.

1.9.3 SEQUENCE OF WORKS FOR ENSURING GOOD PIPE LAYING

1. The required fittings, valves and jointing material should be carefully worked out in beginning. This material should be received in full first of all on site and stored as per directions of manufacturer or as directions given elsewhere in this manual on Standards.
2. The pipes should be received on site only after the above fittings, valves and material for joints has been received and all necessary preparation for laying has been made.
3. The material received should be checked for inspection certification as per contract and damage during transportation. All damaged material should be separated and not used.
4. The pipes received should be stored strictly as per directions of the manufacturer or as mentioned elsewhere in this manual or standards.
5. The pipes and other material should be again inspected for any damage before use in the trench.
6. The fittings and valves should be installed in sequence with the laying of pipes without leaving any gaps.
7. It is desirable to lay the pipe lines from the end from where it can be connected to the water source to enable regular flushing of laid pipes.
8. The entry of dirt or any foreign material in the pipe should be religiously prevented.
9. Each joint should be carefully checked for its completeness before covering up.
10. There should be a commensurate progress in trench excavation, laying and jointing of pipes, fittings, valves etc. and testing of laid pipes in sections so as to complete testing of all pipes laid in quick follow up of completing laying and jointing.
11. Disinfection of pipe lines should be carried out before commissioning.

1.9.4 DAMAGE TO PUBLIC UTILITIES

All precautions shall be taken during excavation and laying operations to guard against possible damage to any existing structure/pipeline of water, gas, sewage etc. After excavation of trenches, pipe shall not be lowered unless the dimensions of trenches and bedding for work for pipes at the bottom of the trenches are approved by Engineer-in-Charge. Pipes and fittings/specials shall be carefully lowered in the trenches. Special arrangements such as cranes, tripods with chain pulley block for lowering the pipes and fittings/specials shall be made by contractor. In no case pipes and fittings/specials shall be dropped.

1.9.5 REINSTATEMENT OF ROAD/ FOOTPATH

Wherever the road is required to be cut, the Department shall obtain prior permission from the concerned authorities. The Contractor has to prepare a negotiable diversion, at his cost, before taking up road cutting. After the line has been laid and the trench refilled to the original level, the traffic may be allowed to pass through. After the pipe is laid the road must be properly re-graded and the damaged portion of road as well as the re-graded portions must be made good.

1.9.6 CLEARING THE SITE

All surplus materials, and all tools and temporary structures shall be removed from the site as directed by Engineer-in-Charge and the construction site left clean to the satisfaction of Engineer-in-

Charge.

1.9.7 DAMAGE TO OTHER SERVICES

Contractor shall take the necessary precautions avoid the damage to other services such as water supply lines, telephone cables, electrical cables, storm water drains etc. in case of any damages to any of the services, contractor shall be responsible for restoring the facilities in bare minimum time at his own cost. The other utility services and traffic shall be maintained as per standard engineering practices.

1.9.8 INSTALLATION OF VALVES & METERS

Material as specials, Sluice valves, Air Release Valve, etc. and equipments required for the complete work shall be supplied/arranged by the contractor as per technical specifications given.

The installation of valves shall be made according to the instructions of the manufacturer and the Engineer in Charge. The bulk meters shall be installed as per the manufacturer's recommendations. For installation of valves & meters on bye-pass, flanged pipes and specials and suitable dismantling pipe with detachable joint shall be used. Air release valves should also be installed all along ascertaining length of pipe line when air is likely to released from solution due to the lowering of the pressure, against especially at points of decrease in gradient. Other places where air valve are required are on the discharge side of pumps and at high points on large mains and upstream of orifice plates and reducing trappers. Air release valves should be fitted around every 1 Km. along descending sections. Air release valves designed specifically to vent, automatically and when necessary, air accumulations from lines in which water is flowing. The use of air release valves eliminates the possibility of the on binding and permits the flow of water without damage to pipe line.

1.9.9 FIXING:

Loading at store and unloading at site of works shall be done carefully using suitable mechanical handling devices such as crane, chain pulley etc.

Arrangement of housing of valves in chambers on stable and firm foundations. The chamber and top roof cover with removable lid shall be provided so that it shall be possible to remove or replace or recondition the valves seats and to remove the parts without removing the valves from the pipe work. For this suitable flange adapters may be provided. Butterfly valves shall be installed in the pipe work in such a manner that they can be removed from the line for dismantling and replacement of rubber seats.

The tightening of nut and bolts shall be done smoothly in such a way that no excessive strain occurs on any one side. The nuts shall be tightened on diametrically opposite site at a time.

1.9.10 JOINTING MATERIAL:

Each valve shall be supplied with all necessary joint ring, nuts, bolts and washers for completing the joints such that it will ensure effective sealing of large orifice even at low pressures.

The weights of floats, in case of air valves, of the same size and type shall not differ by more than 2%.The timber, if used in the manufacture of floats shall be seasoned and those provided in large orifice shall be ebonite coated. The float provided in high pressure chamber, if manufactured from seasoned wood, shall be coated with "ethylene propylene Rubber" (EPDM)

Sluice or butterfly valves shall be installed between flanges according to the instructions of the manufacturer.

Valves shall be placed on a support of concrete so that no shear stress is in the flanges. In case of axial thrust due to closure of a valve against pressure the valve shall be anchored in the support in a suitable manner to transfer the thrust into the floor slab of the chamber.

Scour valves shall be installed at the locations specified by the engineer-in-charge.

1.10 CIVIL WORKS

Specification of material used, workmanship, testing and sampling of materials shall be in accordance to respective provisions laid down in the chapter " Specifications for Civil Works" of this Volume II of bid document.

1.10.1 DESIGN CONSIDERATIONS:

The design of various components of civil works to be provided along the alignment shall be done for "design loading" defined in chapters referred above of this volume II of bid document.

In addition to these design requirements detailed in chapter referred above , the design of anchor blocks, thrust blocks shall be done for as per the provision of IS codes.

The pipeline laid near the road or placed for crossing the road shall be suitably **encased in M20**

cement concrete of design thickness.

1.10.2 GRADE OF CEMENT:

For construction of Valve Chambers, Anchor blocks and pedestal support, M15 grade of concrete shall be used. The thrust blocks shall be constructed using M-15 grade of concrete. The leveling course, wherever provided shall be of M10 grade.

1.10.3 CHAMBERS FOR VALVES ON PIPE LINE

1.10.3.1 GENERAL

The valve chamber shall be provided to house the different valves. A leveling course of 100 mm thick PCC (1:3:6) shall be provided at the base.

The general arrangement is shown in the drawing of chambers given in Volume III of the Tender document. At all important chambers locking arrangements shall be provided, such locations shall be given by Engineer in Charge. The walls shall be designed to withstand lateral earth pressures. Pre-casted removable Ferro cement covers shall be provided to provide access within the chamber.

Wherever longitudinal forces can occur due to closing of a butterfly valve/scour valve, these have to be taken into account by anchoring the valve either in an anchor block or against the walls of the chamber. The same applies for reducers and tees installed in chambers. The forces have to be calculated with the maximum pressure, which can occur due to hydraulic, static or transient conditions. The minimum force has to correspond to a pressure of 2 bar. The calculations for the dimensioning and the type of such anchoring and the clamps have to be approved by the Engineer-in-Charge. The backfill of the chambers has to be compacted to required density.

Air valve chamber shall have ventilation equal to the 2.5 times the area of the bore of the valve.

To house a number of valves, meters etc. in a common chamber, specially designed chambers as per the provisions detailed herein can also be provided. Drawings and designs of such chambers shall be got approved by the Engineer in Charge.

They shall be constructed in cement concrete of M20 grade and P.C.C in 1:3:6. The top slab cover shall be pre cast reinforced cement concrete slabs. The pre cast slabs shall be provided for a length and width which allows dismantling of the valve without problems. Typical drawings of valve chambers are enclosed in the volume III of the tender document. However, these drawings are for indicative purposes only. The contractor shall submit his own designs and drawings based on the actual site conditions for the approval of the Engineer-in-charge.

The chambers shall be constructed after the laying of the pipes and the assembly of specials and valves. The size of the chambers shall be according to the following criteria as per direction of engineer in charge.

1.10.3.2 CONSTRUCTION FEATURES

The minimum clear opening of the valve chambers shall be as tabulated below:

Size of Valve in mm	Minimum dimensions In direction of flow in mm	Minimum dimensions across the direction of flow in mm
80-100	900	1200
150-200	1200	1200
Above 200	1500	1200

The valve chambers shall be made of M20 grade of concrete as per directions of Engineer in Charge. The thickness of the walls shall be as per detailed design in consideration to the site conditions. Live load of 150 Kg/ sq. cm shall be considered on the valve chamber roof. The valve chambers shall be covered with Ferro Cement covers which shall be constructed to the specifications given herein after. The height of the chamber shall be taken at least 50 cm above natural ground level and it shall be ensured that the run off or other flowing water nearby normally does not enters the valve chamber. Provisions shall be made so that the projections out of ground of the chamber do not form an obstruction to the road traffic.

The minimum thickness of valve chamber shall be as follows:

(i) RCC Walls : 150 mm
(ii) Floor M15 grade : 100 mm
(iii) Reinforced Cement Covers : 50 mm
(iv) Cast in situ RCC slab (in place of covers) : 100 mm

A locking facility shall be provided for all chambers using MS rod, hooks and a lever. The locking arrangement shall be firmly secured in the valve walls.

Provision shall be kept for access to the roof of the chamber and from roof to the floor of the chamber through suitable, masonry/RSS/cast iron/ Galvanized MS ladder steps of width not less than 30 cm.

Each Valve Chamber shall be provided with CC floor in M15 grade of concrete. For drainage of water filled inside the chamber, a 25 mm drain pipe leading to a soakage pit of diameter 900 mm and minimum depth below floor as 750 mm shall be provided. The soakage pit shall be filled with boulders.

Minimum 25 mm GI pipe shall be taken above the air valve chamber for providing necessary ventilation.

Pipes passing through walls should be coated by two layer of soft material (Hessian felt) to allow for differential settling and longitudinal expansion if directed by engineer in charge. Only metallic pipes may be cast into the walls for anchoring purposes.

The work shall include excavation, consolidation, leveling, lean concrete as per drawing, in foundations, finishing, refilling. It shall include all labour and material required for the complete chamber.

1.10.3.3 SIDE CLEARANCE REQUIRED FOR CHAMBERS

Minimum distance of flanges from walls	:	30 cm
Minimum distance of sockets from walls	:	30 cm
Minimum distance between highest point of equipment and roof slab	:	30 cm

1.10.3.4 SPECIAL PROVISION IN SCOUR VALVE CHAMBERS

Scour valve chambers, if required, shall be constructed. The chambers for scour valves shall be off-line and placed on the scour pipe. The provisions shown in the scour valve drawings are to be provided. In scour valve chambers, a attached wet chamber shall be constructed with overflow facilities and pitching on the overflow sides for safety of the chamber.

All specifications and constructional details for the valve chambers apply for the scour chambers accordingly.

1.10.3.5 THRUST BLOCKS / ANCHOR BLOCK

It is proposed to provide anchorage in the form of "thrust block" at each deflection in horizontal as well as in vertical alignment of the pipeline as per requirement of designs, which shall resist the unbalanced pressure at bends. Gravity type of thrust blocks shall be provided at horizontal and vertical deflection in pipeline and shall be designed according to the test pressure and the soil conditions at the site of the thrust block. The thrust shall be according to the field test pressure of the pipe, acting on the outer diameter including the compressed rubber gasket. Before designing the thrust block the Contractor, in coordination with the Engineer-in-Charge shall assess the stability of the soil considering erosion due to wind and water.

The thrust blocks shall be of concrete M15 or grade as specified in IS 456, cast on site with surface reinforcement of about 5 kg/m2. There is no need to provide any reinforcement in thrust blocks to be provided on pipelines of dia 150 mm and below. The calculations for the dimensioning and the shape of the thrust blocks have to be approved by the Engineer-in-Charge.

Design of thrust block shall be done in accordance to the provisions laid down in IS 5330-1984.

The thrust blocks shall be of reinforced cement concrete on site as per design and drawings to be approved by Engineer. Typical drawings of thrust blocks are enclosed in the volume III of the tender document. However, these drawings are for indicative purposes only. The contractor shall submit his own designs and drawings based on the actual site conditions for the approval of the Engineer-in-charge.

The thrust blocks shall be cast directly against the undisturbed soil. If this is not possible, the backfilled soil at the contact surface shall be compacted well to full satisfaction of Engineer so that anchor block is not displaced during operation and testing.

1.10.3.6 BACKFILLING AROUND CHAMBERS AND THRUST BLOCKS

After the completion of chambers and thrust blocks the space between the structure and the excavation shall be backfilled with compacted material. Such backfill shall be placed in layers of 15 cm measured before compaction and wetted to optimum moisture and compacted well as per instruction of engineer in charge.

SPECIFICATIONS OF VALVES AND JOINTS

1. VALVES & OTHER ACCESSORIES

The details and specifications of various types of valves to be used in pipeline system are as under.

1.1 GENERAL

1.1.1 GENERAL OPERATIONAL TORQUE REQUIREMENT OF VALVES IN MANUAL OPERATION

All the butterfly valves and sluice valves installed in the head works areas, of sizes above 300 mm within head works premises shall be electrically operated with a provision of manual operation through suitable gearbox arrangement and handle. The sectionalizing butterfly and sluice valves on the transmission main and other valves in head works area up to 300 mm shall be provided with suitable gearbox and hand wheel. Operation must be possible by one man against maximum design working pressure as per Phase-II HGL. For butterfly valves, the gear box shall be provided with self locking devices. A locking facility shall be provided for the B/F valve in either the fully open, fully closed or intermediate position. Gate valves and butterfly valves shall be provided with position indicators, to show whether the valve is in the open or close position. For sluice valves to be operated manually, suitable operating handle shall be provided.

Electric actuators of sectionalizing valves shall be provided with suitable length of cable so as to connect it to the starter provided on the mobile generating set.

1.1.2 FLANGES

All valves shall be provided with companion flanges. The nominal size and thickness of the MS flanges shall be as defined in IS 6392 for the nominal size and design pressure at the place of installation, the flange drilling for all flanges up to 1500 mm ID shall conform to the provisions of IS 1538 and those above 1500 mm shall conform to IS 6392, but contractor to note that the companion flanges shall be manufactured strictly as per the specification of corresponding valve's flange ,and it will be his responsibility for accurate fitting at site.

No new or additional holes shall be drilled on site. Tapped holes are not acceptable in flanges.

1.1.3 GASKETS & PACKING

Gaskets shall be of Nitrile rubber and ready made matching with respective flanges. Gasket cut out from rubber sheets are not acceptable.

1.2 SLUICE VALVES

The sluice valves of sizes above 300mm in head works shall be electrically operated with a provision of manual operation through suitable gear box arrangement and handle, so as to ensure required effort at hand wheel periphery as 80N maximum. The sluice valves of sizes up to 300mm in head works and all valves installed on the transmission main shall be manually operated. It shall conform to provisions of IS 14846 for valves up to 1200mm. All tests shall be carried out as per the BIS standard.

1.2.1 VALVE GATE POSITION INDICATOR

Valves shall have two position marked at the shut end of the scale, first one corresponding to the position of the gate tangential to the bore of the seating and the second position below the first, corresponding to the position of the gate as it sits on the seating after moving a further distance equal to the depth of the seating.

1.2.2 MATERIALS OF CONSTRUCTION

(1) Body, Door, Dome, Wedge	:	**For PN 1.0** - CI IS 210 Gr. FG 200 (all sizes) **For PN 1.6** - CI IS 210 Gr. FG 260 (up to 800mm) and SG IS 1865 Gr 500/7 (900 to 1200mm)
(2) Hand Wheel	:	Cast Iron IS 210 Gr FG 200
(3) Stem	:	Stainless Steel AISI 410/431
(4) Seat, Door Ring	:	SS 410/CA 15

(5) Shoe Channel & Wedge Nut	:	Stainless Steel AISI 410
(6) Back seat Bush	:	Halprene on SS 410
(7) Drain and air plug	:	Stainless Steel AISI 410
(8) Gland Packing	:	Hemp (greased)
(9) Gasket	:	Neoprene
(10) Rivets	:	Soft annealed SS

NOTE :

1. The material of construction, in general, shall conform to relevant IS standard.
2. All CI & SG Iron must have 2% Nickel and 0.5% Chromium.
3. No Gunmetal or Bronze parts are to be used inside the valve.
4. List of accessories/optional features to be furnished and accessories as approved by the Engineer-in-Charge to be supplied.

1.4 DOUBLE BALL AND SINGLE BALL AIR VALVE

1.4.1 GENERAL

1) The valve shall be capable of exhausting air from pipe work automatically when been filled. Air being released at a sufficiently higher rate to prevent the restriction of the Inflow rate. Similarly the valve shall be capable of ventilating pipe work automatically when being emptied. The air inflow rate being sufficiently high to prevent the development of a vacuum in pipeline. The valve shall automatically released air accumulating in pipe line work during normal working condition.

2) Double Ball Air valve shall be of double orifice type with a large orifice for ventilation for exhaust of the pipeline and small orifice for release of air under working pressure. The valve shall be suitable for maximum working pressure in the system. All air valves shall be provided with isolating sluice valve and flanged end connection.

3) Air valve shall be design to prevent premature closure prior to all air having been discharge from the line. The orifice shall be positively sealed in the close position but float (Ball) shall only be raised by the liquid and not by mixer of air and liquid. The sealing shall be design to prevent the floats striking after long period in the close position.

4) All branched outlets including outlets for Air valves will be with compensation pads (Dia of Main / for branch Dia ratio greater than 3). Diameter of compensation pad will not be less than 1.75 times the O.D. of the branched outlet. Plate thickness for pads will be same that of the main.

5) For outlets with above ratio less than three, then the joints will be of plate reinforcement type.

6) The aperture of valves must be properly designed for which the contractor shall submit design calculations for necessary approvals before the procurement of valves.

7) The air valve should be as per IS: 14845

8) All branched outlets including air valve Tee's will be provided with one ½"BSP coupling duly plugged for measurement of pressure in due course. The closing plug will be in Stainless Steel (AISI 304 or equivalent) with Hex. Head and will be provided with copper washer for sealing.

9) All flanges will be drilled as per I.S. 1538.

10) The gaskets shall be of nitrile rubber.

1.4.2 MATERIAL OF CONSTRUCTION

(1) Body	: CI IS 210 Gr FG 260
(2) High Pressure Orifice & Plug	: St. Steel AISI 410
(3) Low Pressure Ball	: Stainless steel float
(4) High Pressure Ball	: Stainless steel float.

(5) Low Pressure Seat Ring : Dexine (Nitrile Rubber)
(6) Sluice Valve : Isolating Sluice Valve conforming to IS 14846
(7) Spindle : Stainless steel
(8) Bolts & Nuts : MS
(9) The Isolating Sluice valve shall be as relevant IS/as per manufacturer's recommendations

1.4.3 FIXING

The work of fixing appurtenances, i.e. butterfly valves, sluice valves, air valves, scour valves, etc. shall be carried out carefully so as not to damage them during handling, erection and fixing. The work shall be executed in a workmanlike manner under the direction Engineer-in-Charge.

1.5 SPRING LOADED DUAL PLATE CHECK VALVE

1.5.1 GENERAL

1) The valve shall be of flanged type suitable for mounting on a horizontal pipeline.
2) Valves shall possess high speed closing characteristics and be designed for minimum slam condition when closing.
3) Dual plate check valves conform to API 594 and API 598. They shall have resilient sealing. The spring action shall optimise the equal closing rates of each plate especially when the friction coefficients are uneven due to one plate resting upon one another. The plates shall not drag on the seat while opening. The plates shall not vibrate under full or partial flow condition.
4) The minimum body-wall thickness shall conform to those given in Table 1B of API Standard 594.
5) The face-to-face dimensions of valves (including valves with ring-joint facings) shall conform to those mentioned in Table 2B of API Standard 594.
6) The valve body shall be furnished with a clearly visible cat, forged, machined-in, or die-stamped arrow to indicate the direction of flow through the valve.

1.5.2 CONSTRUCTIONAL FEATURES

Double Flanged quick closing non slam spring loaded dual plate generally conforming to API 594 for pressure rating as per requirement at particular section of size equivalent to the delivery pipe shall be provided with following material of construction:

1.5.3 MATERIALS OF CONSTRUCTION

(a)	Rating	As per requirement at particular section
(b)	Body	CI to IS 210 Gr FG 260
(c)	Plate	ASTM, A 216 Gr WCB
(d)	Hinge Pin /Stop Pin	SS. AISI 431
(e)	Springs	SS. AISI 316
(f)	Body & Plate Seat	13% Chromium overlay.
(g)	Seal	EPDM
(h)	Retainer	Carbon Steel
(i)	Body Bearing	SS AISC 316
(j)	Plate Bearing	SS AISC 316

1.6 NUT, BOLTS, WASHERS

The jointing material such as nuts, bolts, washers, pig lead, rubber packing, etc. shall be provided by the Contractor.
Nuts and bolts shall be of the best quality bright steel, machined on the shank and under the head and nut. Studs, bolts and nuts shall be galvanized. Bolts shall be of accurate length so that only one thread

shall show through the nut in the fully tightened conditions. Nuts and bolts shall conform to IS 1363 and IS 1367.

Washers, locking devices and anti-vibration arrangements shall be provided where necessary.

Where there is a risk of corrosion, bolts, nuts and studs shall be designed so that the maximum stress does not exceed half the yield stress of the material under any conditions. All bolts, nuts and screws that are subject to frequent adjustment or removal in the course of maintenance and repair shall be made of nickel bearing stainless steel.

The Contractor shall supply all holding down, alignment leveling bolts complete with anchorages, nuts washers and packing required to fix the plant to its foundations, bed plates, frames and other structural parts.

The Contractor shall procure and keep at site, reasonable excess quantities to cover wastage of those materials, which will be normally subject to waste during erection, commissioning and setting to work.

Throughout erection, the valves shall be supported properly on wooden sleepers, etc and shall be concreted immediately thereafter, as directed. Before the valves are actually fixed, they shall be cleaned and greased and it should be seen that all parts are in perfect working condition. In the case of air valves, the Contractor shall take special care of the dexine joints and the ebonite and /or vulcanite balls until they are fixed in position. They shall be kept immersed in water in suitable containers.

1.7 GASKETS & PACKING

These shall be as per clause 4.1.3. Gaskets shall be of Nitrile rubber and ready made matching with respective flanges. Gasket cut-out from rubber sheets are not acceptable.

1.8 REFLUX VALVES (DOUBLE FLANGED)

1. **SCOPE** : Double Flanged valves of single door, inclined seating, swing check type with by pass arrangement as specified, used for water works purposes conforming to IS:5312 (Part-1) 1984 with amendment No. 1 of Nov. 1988 and of the following nominal sizes & nominal pressure :-

Size of valve	Nominal pressure (MPa)	Bye pass arrangement
80mm to 125mm	1.6	With integral by pass as per fig 1 of IS 5312(Part-1) 1984
150mm to 300mm	1.0	With side bye pass as per fig. 3 of IS 5312 (Part-1) 1984

2. TEST PRESSURE :

The test pressure & maximum working pressure of the valves shall be as given below in accordance with clause 2.1-5312(Part-1) 1984.

Size of valve (MM)	Testing pressure (MPa)	
	Body	Seat
80mm to 300mm	1.5	1.0

3. MATERIAL :

The material used for the manufacture of different component parts shall conform to the requirement given in table no. 1 of IS-5312(Part-1) 1984.

An extract of table 1 in respect of few important parts is given below : -

S. No.	Component parts	Material	Quality of Material
1	Body, cover, door, bearing holders & door face discs, Hinges	Cast iron	Quality FG-200 IS:210-1978
2	Hinge Pins, door, Pin & door suspension pins	High tensile Brass	As per IS: 320-1980 (Grade HT2)
3	Bolt/nuts, nuts for hinge pins	Carbon steel	01.4.6/4 as per IS-1367-1967

4	Body rings	Leaded tin Bronze	LTB-2 as per IS:318-1984
5	Door faces	Natural/Synthetic moulded rubber	
6	Air release for hings pins	Galvanised Malleable iron	

The design of the hinges, hinge pin, door suspension pin etc. shall be suitable to ensure free swinging of the door. In the closed position of the valves the door face shall have close face contact with the body ring. The minimum thickness of metal for bodies, covers & door shall be 8mm & the thickness shall be increased progressively for higher sizes. Each valve shall carry an arrow mark very prominently to indicate the direction of flow. The flanges shall be machined and drilled having dimensions as per IS:1538-1976 part 6.

The inside diameter of the body ring shall not be less than the nominal bore of the valve and shall not exceed the nominal bore by more than 1.5mm. The by pass will be provided of gunmetal or extruded brass having tensile strength of 39 Kg/Cm2. The minimum size of by pass arrangement shall be as per table 4 clause 5-14. All C.I., parts shall be coated with 2 coats of Black Japan conforming to type of IS:341-1971 or paint conforming to IS:9862-1981 but be smooth glossy, tenacious & sufficiently hard and shall not impart any taste or smell to water.

4. The weight of each Reflux Valves shall be as under subject to tolerance in weight (-)5% plus no limit.

Size (MM)	Ferrous parts incl. bolts & Nuts (in Kg.)	Non ferrous parts (in Kg.)	Total weight (in Kg.)
80	26.660	0.340	27
100	35.590	0.410	36
125	49.510	0.490	50
150	55.000	0.150	56.150
200	103.000	2.000	105
250	174.100	2.800	177
300	220.800	4.200	225

5. TESTING :

Each valve shall be subjected to the seat test and the body test as per clause 7 of IS:5312(Part-1) 1984. There shall be no permanent leakage of water during the test.

6. MARKING :

Each valve shall have cast on it the following information :

a) Manufacture's name of trade mark.
b) Size of valves.
c) Flow direction.
d) Nominal pressure.

7. **INSPECTION** : by M/s P.D.I.L. Noida/M/s R.I.T.E.S, Gurgoan. All the testing facilities will be provided by the supplier free of cost.

NOTE:

1) Wherever reference of IS has been given it shall be considered amended upto date at the time of inspection by inspecting agency. Any amendment issued shall be effective only if implemented by B.I.S.

2) <u>Reflux Valve</u>

i) 80mm to 125 mm shall be as per fig. 1 of IS 5312 with integrall by pass arrangement.

ii) 150 mm to 300 mm as per fig. 3 of IS 5312 with sided by pass arrangement.

The weight of valve has been prescribed in specifications to ensure a quality of valves.

1.9 CI Foot Valves Flanged and Screwed

1. SCOPE : Foot valve lift type or swing type conforming to IS: 4038-1986 with latest amendment for used with centrifugal pumps for water works purpose.'

Size of valve	Nominal pressure (MPa)	Type
50mm to 80mm	1.6	Screwed in accordance with IS 1554-1975
80mm to 200mm	1.6	Flanged in accordance with IS 1538-1976

2. Test Pressure:

The test pressure & maximum working pressure of the values shall be as given below in accordance with IS 4038-1986

Size of valve (MM)	Testing pressure (MPa)	
	Body	Seat
50mm to 200mm	1.5	1.0

3. MATERIAL:

The material used for the manufacture of different component parts shall conform to the requirement given in table no. 1 of IS-4038-1986.

An extract of table 1 in respect of few important parts is given below : -

S. No.	Component parts	Material	Conforming to	Grade
1	Housing seat discs and disc plate	Grey Cast iron	IS:210-1978	FG 200
2	Hinge Pins, disc guide	a) High tensile bars (b) Stainless Steel	IS:320-1980 IS:6603-1972	HT2 O4Cr Ni10
3	Strainers	a) Grey cast iron b) Galvanized Steel	IS:210-1978 IS:277-1985	FG 200 --
4	Disc faces	a) Vegetable tanned leather (Thickness 3mm, Min) b) Leaded tin bronze c) Natural rubber (with reinforcement of cotton canvas) b) Synthetic rubber (with reinforcement of cotton canvas)	IS:581-1976 IS:318-1981 IS:5192-1975 IS:7450-1974	--- LTB2 Grade 1, Type B Grade 1
5	Flange Jointing nature	a) Compressed fibre board or rubber of thickness 1.5mm, Min. The Fibre board shall be impregnated with chemically neutral oil and shall have a smooth and hard surfaced. b) Compressed bestos fiber	IS:638-1979 IS:638-1979	Type B Grade W/3

The design of the hinges, hinge pin, door suspension pin etc. shall be suitable to ensure free swinging of the door. In the closed position of the valves the door face shall have close face contact with

the body ring. All C.I., parts shall be coated with 2 coats of Black Japan conforming to type of IS:341-1971 or paint conforming to IS:9862-1981 but be smooth glossy, tenacious & sufficiently hard and shall not impart any taste or smell to water.

4. Testing :

Each valve shall be subject to the seat test and body test as per clause of IS 4038-1986. There shall be no permanent leakage of water during the test.

5. Marking :

Each valve shall have cast on it the following information :

a) Manufacture's name of trade mark.

b) Size of valves.

6. Inspection: A Committee of Executive Engineer (EE) and Divisional Accountant (DA) is hereby constituted for quality assurance of materials before accepting the same in divisional store. This committee shall inspect/ test the received material to ensure its quality/ specifications as per provision of rate contract/supply order. This Committee shall also draw sample for getting tested the materials from approved labs/ institutions in case testing of materials is not possible at their level.

NOTE:

1. Wherever reference of IS has been given it shall be considered amended upto date at the time of inspection by inspecting agency. Any amendment issued shall be effective only if implemented by B.I.S.

1.10 CAST IRON DETACHABLE JOINTS FOR P.V.C. PIPES

1. SCOPE :

The specification for the supply of CID joints for use with uPVC pipes class 3 i.e. 6 kg./Sq. CM conforming to IS : 4985-1988 (Amended upto date) to various sizes as per detailed specification given as under : -

S.No.	Size in mm(OD of Pipes)	Class	Rating Kg/Sqcm.
1.	63mm	3	6 Kg./Sq CM.
2.	75mm	3	6 Kg./Sq CM.
3.	90mm	3	6 Kg./Sq CM.
4.	110mm	3	6 Kg./Sq CM.
5.	140mm	3	6 Kg./Sq CM.
6.	160mm	3	6 Kg./Sq CM.
7.	200mm	3	6 Kg./Sq CM.
8.	225mm	3	6 Kg./Sq CM.
9.	250mm	3	6 Kg./Sq CM.
10.	280mm	3	6 Kg./Sq CM.
11	315mm	3	6 Kg./Sq CM.

2. MASS OF JOINTS :

The value of the mass of joints (excluding mass of rubber rings and nut, bolts) have been calculated by taking density of cast Iron as 7.15 gm/cm value of such approximate mass are as under :

S.No.	Nominal size	Class	Mass of one Joint (Kgs.)
1.	63mm	3	1.90
2.	75mm	3	2.40
3.	90mm	3	2.70
4.	110mm	3	3.50
5.	140mm	3	4.70
6.	160mm	3	5.70

7.	200mm	3	8.00
8.	225mm	3	8.8
9.	250mm	3	11.0
10.	280mm	3	12.5
11.	315mm	3	15.4

2.1 The material of construction shall be as per IS : 8794/1998 (Amended upto date)

2.2 The tolerance shall be as follows : -

Weight of Joints ±8%
(Only casting material)
Diementions (+) No Limit
Wall thickness of coller (-)1.5mm
Cored holes and other diementions ± 2.0mm

2.3 The mechanical & hydraulic test shall be carried as per provision in IS : 8794/1988 (Amended upto date)

2.4 The material of construction, mechanical and hydraulic test shall be as per provision in IS : 8794/1988 (Amended upto date)

3. Each Joints shall have cast (Stamped or indelibly painted)

a) Manufacturer's name/initial or identification mark.
b) The nominal diameter.
c) Class references.
d) Last two digits of the year of manufacture.

4. NUT AND BOLTS :

The nuts and bolts to be supplied shall generally as per IS : 1363-1967 (Specification for Black hexagen bolts & nuts) and with Nuts dia 6 to 39mm and Black Hexegon screws grade 'B' as specified in IS : 1367-1967 (Technical supply conditions for threaded fasteners).

4.1 The mechanical properties of bolts shall be as per clause 4.6 of IS : 1367-1967.

4.2 The mechanical properties of Nuts shall be as per clause 4.6 of IS : 1367-1967.

5. The rubber rings provided with joints shall conform to IS : 5382-1985 in general. The Physical requirements will be as per type 1 C or 1 B of table of relevant ISS.

6. DIMENTIONS :

The diamentions of detachable joints, rubber rings and Nuts & Bolts must be suitable to be used with PVC pipes. The diameter of engagement and joints shall match the corresponding outside diameter of rigid PVC pipes of different classes confirming to IS : 4985. While as actual used at site they should with stand the working pressure of 6 kg/Sq Cm.

7. The Nuts and Bolts shall conforming to IS : 1363 and shall be of the following sizes :

S.No.	Joint of various size	Nuts & Bolts Size	No. required per Joints.
1.	63mm PVC Pipes	10 x 75mm	3
2.	75mm PVC Pipes	12 x 75mm	3
3.	90mm PVC Pipes	12 x 90mm	3
4.	110mm PVC Pipes	12 x 90mm	3
5.	140mm PVC Pipes	12 x 100mm	4
6.	160mm PVC Pipes	12 x 100mm	4
7.	200mm PVC Pipes	16 x 110mm	4
8.	225mm PVC Pipes	16 x 120mm	4
9.	250mm PVC Pipes	16 x 120mm	4
10.	280mm PVC Pipes	16 x 120mm	4
11.	315mm PVC Pipes	16 x 120mm	4

The holes in joints shall be cored holes.

8. COATING :

The coating shall be as per clauses 8.0 of the IS : 8794-1988.

9. SAMPLING :

The requirement for sampling & curatorial for conformity shall be as per Appendix 'B' of IS : 8794-1988.

1.11 PVC JOINTS

Supply of injection moulded/machiner high density polyethylene (HDPE) detachable joints for PVC Pipe required for 63mm to 110mm dia PVC pipe with tolerance in sie as ± 3%.

Following dimensions for Flange & Collar.

FLANGE (MM SIZE)

Nominal dia of PVC Pipe	Inner dia for Flange	Outer dia of flange	Pitch circle dia of flange	Width of Flange	Holes Nos.	Hole dia of bolt
63	64	78	120	22	4	2.5/8"
75	76	90	130	28	4	2.5/8"
90	92	108	152	32	4	2.5/8"
110	111	127	175	34	4	3/8"

COLLAR (MM SIZE)

Nominal dia of PVC Pipe	Inner dia of Collar	Outer dia of Collar	Thickness of Collar	Width of Collar
63	64	77	7	65
75	76	90	8	65
90	92	117	9	74
110	111	127	9	74

* The material of HDPE D-Joints shall be as per IS : 8008
* The material of PVC D-Joints shall be as per IS : 7834/1987
* Nut & Bolts : The nuts & bolts to be supplied shall as per IS : 1363/1987
* Rubber Rings: The rubber ring provided with the joints shall be as per ISS. The physical requirements will be as per 1 – B of table of relevant ISS in general. The dimensions of rubber ring provided with joints shall be as per IS (Amended upto date).
* The PVC should stand working pressure of 6 Kg/Cm2 under condition.

SPECIFICATIONS OF CENTRIFUGAL PUMPING SETS

1. Mono Block Pumping Sets

1.1 SCOPE: These specifications cover supply of Electric Motor driven Horizontal. Centrifugal Pumping Sets of Mono Block type suitable for operation on 3 Phase, 50 HZ A.C. Supply 380 Volts (+/- 15 % i.e. between 323 to 437 Volts) for pumping clear cold fresh water generally conforming to IS: 9079 – 2002 (amended or revised up to date) except for the provisions / specifications mentioned herein, various duty conditions for which the Pumping set are required are given in Annexure I.

The electric motor should be screen protected drip proof or totally enclosed fan cooled AC induction motor of squirrel cage type with synchronous speed of 1450 RPM or 3000 RPM should be designed manufactured and tested generally as per IS: 7538-1996 and provision / specifications mentioned herein for driving the pumping sets.

1.2 TYPE / MATERIAL OF CONSTRUCTION:

1.2.1 PUMP:

(a) Casing and Impeller: Gray cast Iron of grade FG 200 as per IS: 210-1993 (amended or revised upto date)
(b) Casing ring and impeller ring (If provided) casting grade FG 200 OF is:318 1981 (amended up to date) The impeller should be dynamically balanced and eyed to the shaft passage provided through hubs, to give hydraulic balance and also to relieve stuffing box of any untoward loads. As an alternative providing of radial rings of appropriate size on the back of impeller for hydraulic balancing is also acceptable.
(c) Shaft sleeve- Bronze grade LTB-2 of IS: 318 – 1981 or chrome steel 07 Gr. 13 as per IS: 1570 (Part 5) – 1985.
(d) Stuffing box shall be water sealed or mechanically sealed.
(e) Gland – Gray cast iron of grade FG 200 as per IS: 210-1993 or Bronze Grade LTB 2 of IS: 318-1981.
(f) Water Thrower – rubber (Optional).
(g) The direction of rotation should be casted so as to be visible when viewed from driving end of pump shaft (Clock wise or anticlockwise)
(h) For duty head up to and equal to 60 meters the pump set shall be single stage only and for duty head above 60 meters the Nos. of stages shall not be more than two.

1.2.2 MOTOR:

(a)AC 3 Phase 50 HZ induction motor suitable for operation in voltage range of 380 +/- 15 Volts (323 to 437 Volts) without getting overloaded, in the entire range of operation of pump having winding insulated class E/B materials and impregnated to exclude moisture suitable for tropical service conditions. The temperature rise (measured by resistance method) shall be in accordance with the IS: 7538-1996 as per clause 23.1.2. The temperature of cooling medium shall be assumed as 45 degree centigrade. The temperature rise shall not exceed the specified temperature rise limit by more than 10 degree C. When Motor is continuously operated at rated load at 323 Volt as per clause 23.2.1 of IS 7538-1996.

(b) Rotor: Squirrel cage type.

(c) Shaft: Grade 40 C of IS: 1570 (Part – 2)

(d) Enclosure: TEFC / SPDP.

(e) Performance: As per IS: 7538-1996 (amended up to date)

1.3 The pump shall be suitable for satisfactory operation within the range of + 10 % and – 25% of the specified duty point head and the entire range of operation (without noise or cavitations) shall be on the stable portion of the curve. The specified duty point should be as close to the maximum efficiency point as possible.

1.4 Pump test, tolerance and guarantee of pump performance shall be as per IS: 11346 – 1985 (amended up to date) and that no negative tolerance ion quoted efficiency shall be allowed. The prescribed performance at duty point shall be tested at the voltage 380 Volts. The test at duty point shall be carried out with a minimum suction lift as defined in Clause 10.1 (b) of IS: 9079-1989.

1.5 Guaranteed efficiency at duty point (under operation at prescribed voltage i.e. 380 V should be quoted without any negative tolerance. In all cases this overall efficiency should not be less than the calculated overall efficiency based on pump efficiency as given in figure 1 & 2 of IS: 9079-1989 (amended up to date) and motor efficiency for quoted motor KW as given in table in these figures.

1.6 Pump shall be suitable for use up to minimum suction lift as specified in Clause 10.1 (b) of IS: 9079-1989. The offers not in consonance with this minimum menomatric suction lift are liable to be rejected. The NPSH requirement of pump shall be in consonance with this provision. The cavitations test shall be conducted as per clause 5.7 of Appendix "D".

1.7 The master curves of pump only are not acceptable. The firm should submit specific duty point curve covering complete working range. The curve should indicate following relations as minimum requirement of the curve:-

1) Discharge V/S Head.
2) Discharge V/S Overall efficiency.
3) Discharge V/S Pump efficiency.
4) Discharge V/S NPSH required.

1.8 The prescribed performance of the pump set including NPSH r at duty point will be checked and guaranteed at the rated speed at rated voltage of 380 Volts and rated frequency of 50 HZ The motor rated KW shall be suitable for operation of pump in range from + 10 % to –25 % of duty head. The actual performance shall however also bed recorded at the lowest voltage i.e. at 323 volts by the inspecting agency in the inspection certificate and it shall be ensured that motor does not get over loaded.

1.9 The output motor rating shall be as per clause 15 of IS: 9079-1989.

1.10 The motor shall be suitable for entire working range of pump from + 10 % to –25 % of duty head. Motor rating should be higher or equal to highest of the following:
a)Consumption at + 10 % of the duty head of pump.
b) Consumption at – 25 % of the duty head of pump.
c) Consumption at duty point of pump plus margin as given below:

BKW required at operating point	multiplying factor to decide drive rating
Up to 1.5	1.5
Above 1.5 to 3.7	1.4
Above 3.7 to 7.5	1.3
Above 7.5 to 15	1.2
Above 15 to 75	1.15
Above 75	1.1

1.11 Marking: The marking shall be as per relevant IS Code.

2. HORIZONTAL SPLIT CASING CENTRIFUGAL PUMPS COUPLED WITH ELECTRIC MOTORS.

2.1 These specifications cover supply of centrifugal pumps generally confirming to IS 6595 (Part-2) 1993 (amended up to date) directly coupled to AC Induction Motor generally confirming to IS:1978 (amended up to date) through a flexible coupling mounted on a common study and robust C.I./Fabricated M.S. base plate manufactured by pump manufacture. The base plate should be

designed to withstand load and vibrations of complete unit. After proper alignment of unit base plate should not show any vibration during the entire range of pump operation. Coupling guard should be provided to give safety against accidental breakage of coupling.

2.2 MATERIAL OF CONSTRUCTION AND OTHER DETAILS:

(A) PUMP:

Specification: IS 6595 (Part-2) 1993, (Amended up to date)

Type : Horizontal Split Casing

Speed at duty condition: Matching with nominal speed of prime mover.

Suction (in meters)

(1) MATERIAL OF CONSTRUCTION:

- Casing : Gray cast Iron of grade GF-200 as per IS:210 - 1978 (amended or revised up to date)
- Impeller, casing ring and Impeller ring (if provided) bronze grade: TB-2 of IS: 518-1981 (amended up-to date). The impeller should be dynamically balanced and keyed to the shaft passage provided through hubs, to give hydraulic balance and also to relieve stuffing box from any untoward loads. As an alternative, providing of radial ring of appropriate size on the back of impeller for hydraulic balancing is also acceptable.
- Shaft sleeves: Bronze grade LTB-2 of IS: 318 - 1981 or chrome steel 07 Gr.13 of IS: 1570 (Part-B) 1986.
- Gland: Gray cast iron of Grade FG-200 as per 210-1978.
- The direction of rotation should be casted so as to be visible when viewed from driving end (clockwise or anti-clockwise)/
- Pump shaft should be 40 C 8 of IS: 1570 (Part-2 section) 1979.

(B) MOTOR:

1. AC 3 phase 50 Hz induction motor suitable for operation in voltage range of 415-volt + 6% -15% without getting overloaded. Winding insulation shall be class B/F insulation (in case of class F insulation, temperature rise limit shall be as per class B insulation) and impregnated to exclude moisture. It shall be suitable for tropical service conditions. The temperature rise (measured by resistance method) shall be in accordance with the IS: 325-1978. The temperature rise shall not exceed the specified temperature rise limit in table-1 by more than 10 degree centigrade, when motor is continuously operated at 350 volts)
2. Rotor: Squirrel cage type.
3. Shaft: Grade 4008 of IS 1570 (Part-2) 1979
4. Shaft: SPDP/TEFC (as per purchaser's requirement)
5. Synchronous speed: 1500-RPM (Maximum) Pump RPM should be designed on the basis of actual speed available corresponding to synchronous speed of 1500 RPM.
6. Performance: As per IS 325-1978 (amended or revised up-to-date) but for voltage range it shall be +6% and -15% of 415 volt.
7. Motor should not get over-loaded in the entire operating range of pump from +10% to -25% of specified duty point head. Motor rating should be higher or equal to higher of the following:-

(a) Consumption at +10% of the duty head of pump.

(b) Consumption at -25% of the duty head of pump.

(c) Consumption at duty head of pump plus margin.

As given in table 11.4 of "Manual of Water Supply & Treatment" which is as follows: =

BKW required at the Multiplying factor

Operating Point	Decide drive rating
Up to 1.5	1.5
1.5 to 3.7	1.4
3.7 to 7.5	1.3
7.5 to 15	1.2
15 to 75	1.15
Above 75	1.1

- The pumping set shall be suitable for satisfactory operation within the range of +10% and -25% of the specified duty point head and entire range of operation of pump (without noise, cavitations) shall be on the stable portion of the curve. The specific duty point should be as close to the maximum efficiency point as possible. Pump test, tolerance, guarantee of pump performance shall be specified as per IS 6595 (Part-2) 1993 (amended up-to-date). Negative tolerance on quoted pump efficiency shall not be allowed. The test at duty point shall be carried out at given suction conditions. The NPSH required on duty point shall not exceed four meters or as prescribed specially.
- Minimum guarantee efficiency at duty point should be quoted without negative tolerance.
- The firm should submit specific duty point covering complete working range. The curve should indicate following relations as minimum requirement of the curve.

Discharge v/s head.
Discharge v/s pump efficiency
Discharge v/s pump input.
Discharge v/s NPSH required.
The performance curves and various related data for pump and motor submitted with the offer should be authenticated by respective manufacturers. Offers received without an authentication may be made liable for summarily rejection.

3. VACUUM PUMP: -

The vacuum pump sets shall be electric driven monoblock type for priming of centrifugal pumps, handling of clear water of temperature not more than 30 degree and bearing of sufficient capacity.
Pump Casing: - CI Grade FG-200 of IS: 2010
Stage of Pump: - Single stage
Rotor/Impeller; - GM/Bronze as per IS: 318-1981
Pump Shaft: - Carbon steel grade C-40 as per IS: 1570 Part-II:1989
Electric motor: - 2800 RPM/3 Phase/50 Cy/sec/AC Main 440 V
Pump size: - Suction/Delivery – 25mm/25mm
Maximum displacement: - 22 cum/Hr

4. Miscellaneous requirements

4.1 Nameplates, signboards, nomenclature

Each item of the plant shall have permanently attached to it in a conspicuous position a nameplate, on which shall be engraved or stamped the manufacturer's name, type and serial number, year of manufacture, details of the design capacity etc. Such labels shall be of non-hygroscopic material to be approved by the Engineer in Charge.
Near by or on each item of the plant, shall be fixed a plate with the name and nomenclature (code) of the item according to the project nomenclature. It shall be visible from a distance of several metres.
The contractor shall also provide bilingual signboards and instruction tables of durable material, throughout the plant, for the purposes of operation, maintenance and security:

- Danger and caution signs (English and local language)
- Preventive maintenance schedules (local language)
- Operating instructions (local language)
- Unit names (English and local language)
- Nameplates at the doors to the units (English and local language)

Signboards and plates shall be appropriately sized in relation to the relevant item and its surroundings. Details of the proposed inscription, size, material and colours shall be submitted to the Engineer in Charge for approval before any signboards or plates are manufactured. They shall be compatible with the instructions in the operation manual.
All cables shall be provided with clip-on identification numbers on both ends and at all terminations in between, for identification. The nomenclature shall correspond to the electrical as-built drawings.
The nomenclature and labeling of the plant shall be decided in close co-operation with the Engineer in Charge.

SPECIFICATIONS OF ELECTRICAL CONTROL PANEL

1. CABLES

1.1 There is one transformer installed at main pump house at Head Works. The contractor has to install one No. armored copper cable from transformer bushing to L.T. re-wirable fuse unit installed near transformer.

1.2 From this L.T. fuse unit, one armored copper cable of is required to be supplied & installed for main pump house. This cable is to be connected with main MCCB at incoming sides as specified.

2. CUBICAL PANEL

2.1 The contractor has to supply, install erect and commission floor mounting front and side openable cubical panel made out with 16 S.W.G. C.R.C.A. sheet duly painted with two coats of primer and after that powder coating as per specifications laid down in Electrical BSR 2008. The cubical panel should have cuttings for M.C.C.B.s, M.C.B.s, Ampere meters, Volt meters , Ampere meter & volt meter selector switches , R-Y-B L.E.D. type indication lamps 18.5 mm diameter.

2.2 All the cut outs should be on front cover of the cubical panel and having arrangements for proper mounting of all the accessories like M.C.C.B.s, M.C.B.s Amp. & volt meters along with their selector switches etc. as required.

2.3 For each motors one T.P M.C.C.B of appropriate breaking capacity & relay setting with adjustable short circuit and adjustable over load setting, confirming to IS 13947-2/IEC 609472 with front face and centralized adjustable line – load interchangeability is to be provided & fitted on the bus bar chamber.

2.4 One quick make quick break 3 pole current limiting M.C.C.B. having appropriate breaking capacity adjustable over load & adjustable short circuit setting and confirming to 1S:13947-2 /IEC 609472 with front face & centralized adjustable line load inter changeability is to be supplied and installed as main incomer of each panel

2.5 There should be a provision of one double pole and four single pole M.C.B. for lighting Circuit .The incoming if light circuit must be from incoming of main M.C.C.B so that in case of any fault in starter panel there should be light in the control room.

2.6 The output of all M.C.C.B is connected with electrolytic aluminum bus bar of size 25mm X 10 mm for each phase & 25mm x6 mm for neutral. These bus bars must be mounted on non hygroscopic bus bar insulators and the length of the bus bar should be one meter each.

2.7 From this bus bar 5 output circuits wilt be taken out for each panel respectively as per single line diagram.

2.8 One Double Pole MCB along with two single pole MCB arc also to be supplied & fitted on both the M.C.C.'s for lighting circuits.

2.9 M.C.C. must be equipped with one ampere meter along with CTs & selector switch for measurement of load on entire M.C.C. & ampere meter along with selector switch is to be supplied & fitted for measurement of load on each phase of all the motors.

2.10 One Voltmeter along with selector switch & three L.E.D. type Indicators which should be protected through 3 Nos. 1 Amp S.P.M.C.B. will be supplied & fitted on this board.

2.11 All the ampere meters must be C.T. Type with changeable dial plate. The make of all the switchgears and metering equipments must be as per category first of P.W.D. Electrical B.S.R 2008.

2.12 All the nuts, bolts and washers should be high tensile and galvanized. Spare space for one MCCB along with FASD Starter and space for one MCCB along with one DOL Starter should be taken in panel board.

3. STARTERS

3.1 There should be one fully automatic star delta starters for each Motor as specified and extra space for one starter for extra motor.

3.2 Each F.A.S.D. starter should consist of main contactor, one star contactor, one delta contactor, one

electronic star delta timer 6-60 sec, one bimetal overload relay & two push button for ON-OFF, one L.E.D. indicator for ON indication of starter along with necessary power & control wiring. The size of power cable should be 10 Sq.mm copper and the size of control cable should be 1.5 Sq.mm. Copper.

3.3 Control wiring of all the starters must be protected through 2 numbers 2 to 4 amp. S.P. M.C.B.s and each end must be crimped with copper cable lugs as required.

4. EARTHING

4.1 Earthing should be done as per I.S Specifications by digging an earth pit of about 20 feet deep A hot dipped. G.L plate of size 2 feetX2 feet 6mm thick and 50mmX6 mm hot dipped G.I. tape duly welded is to be supplied & laid in earth or on the walls with refilling earth with alternate layer of sand and charcoal. This strip is to be connected with panel board as well as to all the motors. Two earthing arrangement needs to be done as per norms of electrical safety rules.

TENDER DOCUMENT FOR

CONSTRUCTION & COMMISSIONING OF RCC OHSR 300 KL CAPACITY VILLAGE PALANA

TEHSIL BIKANER
DISTRICT BIKANER

ESTT. COST: RS. 42.00 LACS
NIT NO. 317/2019-20

VOLUME-II

WORK DESCRIPTION AND SPECIFICATIONS

EXECUTIVE ENGINEER
PHED DISTRICT RURAL DN.II BIKANER

Volume-II

WORK DESCRIPTION AND SPECIFICATIONS

Volume – II

(Scope of work & Technical Specifications)

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WORK DESCRIPTION

General Details:- The main component to be executed at Palana water supply scheme.:-

i. Construction of RCC OHSR of capacity of 1 no. 300 KL and 18 m staging at village Palana.

ii. Providing, Laying & jointing of pipe line rising of following size excluding supply & fixing of CI Specials:-

S.No.	Dia in mm	Length in m		
		Gravity main	Rising main	Distribution main/ service lines
1	200mm dia DI-K7	-	160	-

iii. 1 year defect liability period.

2. **The particular conditions of the present package**

Location and site condition: - Village Palana is 20 Km. far from Bikaner district head quarter.

3. **Scope of work for contractor**

The work will include the following items of which specifications are as enclosed:-

a) Submission of all documents required according to the contract such as agreement, security money /guarantee, insurance policies, time schedule, payment schedule etc.

b) SBC testing at OHSR site, submission of design and drawing of OHSR duly proof checked by MNIT, Jaipur/ MBM Engineering College Jodhpur, construction, commissioning and testing of OHSR, on approved drawing and design. SBC testing at site of OHSR shall be carried out by contractor on his own cost.

c) Submission of design and drawing of civil and RCC CWR structures with construction, commissioning and testing of structures.

d) Construction of all units as mentioned in work description as per specifications and drawing.

e) Providing, installation and testing of pumping machinery for clear water including suction and delivery arrangements, control panels and complete commissioning of pump house and complete interconnection.

f) Providing, Laying, jointing, testing & commissioning of Pipe lines.

g) Testing of all structures and system and commissioning

h) Final site clearance

i) O&M for 1 year along with defect liability period for which no payment shall be made to the Contractor.

Contractor shall be fully responsible for the soundness of the construction and structural safety and water tightness of the structures based on the specifications and sound engineering practices and LS provision.

3.1 RCC Over Head Service Reservoir (OHSR)

Construction and commissioning and testing of 1 No. OHSR having cap 300 KL, 18 M staging on approved drawing and design.

The scope of work against OHSR in this tender includes design, construction commissioning of testing of OHSRs 1 No.(INTZ type tank) of 300 KL capacity at 18 m staging (Column staging) as per following specification & details of work, material etc.

The safe bearing capacity of soil as assumed at foundation level is 7.0**0 M.T. per sqm** for **300 KL OHSR at 2.50 M.** depth for OHSR site. The depth of foundation excluding PCC shall not less than 2.50 M. Contractor has to carry out the SBC test at the OHSR site at his own cost. If the SBC on testing, found out lower than the value taken in tender document, then OHSR has to be designed on this lower value, otherwise the value taken in Tender Document has to be considered for design of OHSR.

Preparation & submission of detailed drawing & design of OHSR of required capacity, staging & shall be INTZ type shape, supported on raft foundation without annular hole. This shall not include the design of pipe, valves lighting arrestor, conductor, earthling system, which shall be as stipulated in tender document.

(A) Tentative quantities to be used in the construction of one RCC OHSR of CAPACITY 300 KL and 18 m staging :

S.No.	Particulars	Size (In mm dia)	Unit	Qty. (Appx.)
1	CI/DI D/F Pipes (Inlet/over flow)	250/300	Mtr.	70
2	CI/DI D/F (outlet)	300	Mtr.	35
3	CI/DI D/F Pipes (wash out)	150	Mtr.	35
4	CI Puddle collars 120cm. long	300	No.	2
5	CI Puddle collars 120cm. long	250	No.	1
6	CI Puddle collars 120cm. long	150	No.	1
7	CID/F Duck foot Bend	300	No.	2
8	CID/F Duck foot Bend	250	No.	1
9	CID/F Duck foot Bend	150	No.	1
10	CI Flanged Bell mouth	300	No.	1
11	MS nut bolt full thread	20x90 20x75	Kg.	as per requirement
12	MS nut bolt full thread	16x75	Kg.	as per requirement
13	CI D/F Bend – 90 degree	300	No.	2
14	CI D/F Bend – 90 degree	250	No.	1
15	CI Tail piece	300	No.	4
16	CI Tail piece	250	No.	2
17	CI D/F Sluice valves	300	No.	4
18	CI D/F Sluice valves	250	No.	2
19	CI D/F Sluice valves	150	No.	2
20	CI Non return valve	250	No	1
21	CI D/F Tee	300 x 300 x 300	No.	1
22	Rubber insertion sheet 6mm	As per requirement		

Cost for the above material will be included in cost of OHSR as quoted by the contractor in Part –II(a) of price schedule. Any other special/ pipe length required to complete above job shall be supplied by the contractor without any extra cost. The cost of works & materials for construction of plinth protection, sluice valve chambers ,interconnection of rising main pipe line with inlet of OHSR, interconnection of outlet pipe & overflow pipe (D/S of outlet valve) with distribution pipe line has also been be considered as included in the cost of OHSR.
All OHSR piping shall be terminated 6 M. beyond the boundary of plinth protection of OHSR. The outlet pipe shall be connected to the MS distribution header (to be fabricated by the contractor) of size 300mm of length 6.0 Mtr. with multiple outlet size varying from 100mm to 200mm with sluice valves with suitable valve chamber as directed by EIC and cost of this item shall be included in the cost of OHSR. Hence no separate payment should be made to contractor for above mentioned works.

The testing of tank for water tightness by filling it with water shall be the contractor's responsibility & shall have to be done in accordance to the procedure laid down in the tender document.

The entire structure along with all its installation shall be in finished condition when handed over. All the exposed surfaces should be nicely finished with carbora Dom stone rubbing.
Before handing over the work, the site has to be cleaned in all respect. The earth has to be leveled at a uniform level & surplus earth, if any shall have to be disposed of as per direction of Engineer in charge.

Painting the slogan
For providing good elevation on outside of container along with the water proof paint of approved color & also painting of approved shade on all iron work & GI pipe railing etc. and painting slogan as instructed by Engineer in charge.

No separate payments will be made for the reconnaissance, preliminary investigation, surveys, inspections, plinth protection site clearance etc. They shall be included in the Lump sum rates.

The contractor shall be fully responsible for Technical suitability of design, soundness of the contractor structural safety & water tightness of the structure based on the specifications, sound Engineering practices & latest IS provision.

The details & the different sizes of the pipes for the OHSR shall be as follows:-

S.NO.	Items	Details 300 KL OHSR
1	Capacity of CUM	300
2	Staging in Meters	18
3	Inlet pipe size in mm	200
4	Outlet pipe size in mm	200
5	Over flow pipe size in mm	200
6	Washout pipe size in mm	100

Note: - Staging is defined as the difference of levels between the finished ground level & bottom of the water retaining structure (top of the bottom ring beam). The scope of work of lump sum contract for the contractor shall include all preparations execution & testing works within the defined limits of contract.

Supply CI/DI D/F pipes,

All required material as listed above will be supplied by the contractor as per technical specifications including fixing of all ancillary material as stipulated including inlet, outlet, washout, overflow pipes, duck foot bends, other specials.

RCC Stair Case & ladder

90cm. wide stair case of RCC shall be provided from foundation to the level where sufficient headroom is available below balcony. Staircases will go around the circle inserting the columns. At ground & then at each column junction & then at top sufficient landing space is to be provided. Rise of step is to be kept 15 to 17.5cm. & trade around 22.5 to 22.0 cm. On stair 0.9 m. clear height railing consisting of vertical post of angle 50 x 50 x 6mm firmly grouted to full depth in concrete at center of each flight & initial & last point of each flight on landing of stairs (three Nos. on each landing & last point of each flight on landing of stairs (three Nos. on each landing & two Nos. on each flight) with GI 20mm medium class pipe in two rows at both side in full length of stairs is to be provided.

From last landing to balcony box type 0.60m. wide MS fabricated ladder with steps & railing is to be provided & fixing in concreting of landing at bottom & extended beam slab beyond balcony. For fabrication of box type stair case 2 rows of MS angle section of 75x75x6mm on each side are to be welded by braces & in between the two steps by MS angle iron of 50x50x6mm & 6mm thick MS sheet are be to provided. At the bottom MS sheet 5mm thick is to be welded with the framed structure, Railing of MS angle 50x50x6mm. & 20mm GI pipe to be welded with the ladder.

From balcony to top of tank 0.45m. wide MS box type ladder with railing of above specification will be provided. The ladder is to be fixed in concrete of balcony & at this point width of balcony is to taken as 1.50m. in 2m. length of balcony. At roof tope level landing is to be provided of 1x0.80m. by casting cantilever slab Railing around landing is to be connected with roof top railing.

Inside the tank 0.45m. wide aluminum ladder using double row of aluminum channel 75x75x6mm and 20 mm bars @ 40 cm C/C from top to bottom is to be provided and suitably fixed at top and embedded in CC block 60 cm X 60 cm X 60 cm at bottom for ensuring full stability of ladder.

Balcony & its railing.

Balcony 90cm. wide is to be provided at the junction of vertical conical wall of tank & at the point where MS box type ladder from balcony to top of tank is to be fixed, the width of balcony is to be taken as 1.5m. in 2m. length of balcony. 1.0m. height railing consisting of vertical posts of angle iron size 50x50x6mm firmly grouted to full depth in concrete at 1.5m. apart with GI 20mm medium class in two row around full length of balcony is to be provided.

Roof Railing

1.00m. high railing around the tank at roof top is to be provided comprising of MS angle 50x50x6mm. 1.0m. height above roof top. 1.5m. apart & firmly embedded in roof concrete 20mm GS tubes medium class in two row are to be provided through the angle iron by making holes of suitable size in angle iron.

Ventilator

1.2m. dia & 0.60m. high circular ventilators is be provided at the top center of tank. Ventilator frame is to be provided comprising of two circular MS flat rings of 50x6mm at top & bottom with 12mm MS vertical bars placed @ 10cm. C/C duly welded to circular rings. Around his frame expanded metal size 20 to 25mm of 18 SWG is to be fixed by beading with flat of 20x6mm as first fold. Second fold of wire gauge 14 mesh x 24 gauges is to be wrapped around it. Top cover of RCC circular slab of 1.40m. dia 7.5cm. x 6mm flat ring of 1.4m. dia having 8mm 15cm. C/D mesh welded in it, is to be fabricated & then concreting of nominal mix M. 25 is to be provided.

Manhole cover.

60x60cm. manhole at top of tank is to be provide made of MS fabrication 75x75x6mm angle iron frame & 4 Nos. hold fast of 100mm length same size of angle iron are to be grouted well in concreting MS cover 5mm thick MS sheet two suitable hinges of 150mm length & locking arrangements is to be provided.

Lightening Arrestor :

Lightening arrestor of aluminum comprising of 2.0m. long rod of 200mm dia with ball & 3 prongs to be provided at top & to be carried to ground by aluminum strip of 32mm x 6mm upto earthing plate at 3.5m. below GL Earthing with GI earth plate 600mm x 600mm x 6mm thick including accessories embedding by digging 3.5m. below GL & refilling with 8 alternate layers of salt, char coat & providing masonry enclosure with cover plate & watering GI pipe 50mm class B with funnel etc. as per ISS 3043 complete at required.

Electronic Water level indicator:

Providing and fixing electronic Water level indicator with specified nos of level indications including p/f prons in overhead tank necessary cabling from level indicating panel to prones in over head tank in proper manner as per direction of engineer in charge.

Mesh on outlet pipe.

On the flange of delivery pipe & wash out pipe in the tank mesh made out of copper rod of 8mm dia 5cm. C/C welded to copper circular frame of size 50mm x 5mm equal to diameter of flange, so that this mesh can be fixed by providing nut bolts on the mouth of delivery pipes.

Stair Door

One steel door with frame & single leaf shutter of size 0.90cm. x 2.0m. is to be provided & fixing with the column at the starting of 2^{nd} and 3^{rd} flight of RCC stair case. Angle iron frame of size 50x50x6mm all round the shutter along with fixing locking arrangements is required MS shutter of 16 SWG braces is to be provided.

Pipe clamp

Fixing inlet, outlet overflow, & washout puddle collar & pipes shall be done by MS Clamp of suitable shape made of MS strip size 75mmx10mm thick, by the contractor up to ground level. Rubber sheet, Nut bolts shall be supplied by the contractor. All nuts & bolts (galvanized).

Necessary clamps to fix the pipe with columns shall be made out of MS flat 75x6mm size two in each column height between two braces shall be provided by contractor. Galvanized nut bolts are to be provided in each clamp with nut bolts, which shall be supplied by the contractor at his own cost as per enclosed drawings.

Slogan & Logo

The contractor shall paint a area of 6mx3m on the vertical wall of the tank portion by using 3 coats of plastic emulsion pain of shade as approved by the Engineer in charge to from a based for writing the slogan & logo. For writing the slogan the letters shall be of 30cm. size. The size of logo shall be 75cm. The shade for painting the slogan will be approved & directed by Engineer in charge. The capacity of OHSR should be painted as per Engineer charge in surface area of 10 sqm.

Plinth protection :

This also includes construction of plinth protection work around OHSR after fixing vertical & horizontal CI pipes & testing of pipe line at full tank level. For plinth protection 0.36m. wide circular brick masonary wall in 1:6 cement mortar having inside diameter of foundation raft plus 1.00m. The depth of wall is to be taken as 1.00m below G.L.& 0.60m above G.L. and below it 0.45m. wide 0.10m. thick CC 1:3:6 is to be provided. Thus total height of wall will be 1.60m. Top of wall and outer surface upto 0.90m. depth is to be plastered by cement mortar 1:4 of 20mm thick in 2 layers. Then the excavated earth should be filled in layers by ramming and watering inside the circular wall covering whole of the pipe and foundation. Over the filled up earth CC 1:3:6 of 7.50cm. thickness is to be provided in the entire area. Over it CC flooring 1:2:4 mix M-15 grade 150mm thick is to be done. The whole of the top surface should be finished by concrete slurry periphery is to be given so that rain water does not accumulate.

Plinth protection work are to be constructed below the over head service reservoir it shall be extended 1m. from fall of balcony or edge of raft slab. Which ever is more all around service reservoir, it shall consist of laying cement concrete 150mm thick in M 10 over compacted soil.

Painting

It not otherwise stated metallic surfaces shall receive one initial cost at the manufacturer's workshop. After arrival of the equipment on site the same shall be inspected and damaged portion shall be cleaned and given the primer and under coat of similar paint. After erection all metal work shall be painted as follows.

Painting of metallic surfaces and water proof cement paint on complete structure.

All mild steel railing, gate frame, MS ladders.	Primer of red oxide, tow under coats and one finishing coat of approved enamel paint and of approved shades.
Complete RCC structure	Water proofing cement paint of approved shades in two or more coats upto fine finish.

Recommended makes of paints.

ICI Ltc. Jenson and nickolson Ltc. Asian paints Ltd. Godless nerolac, Ltd. Shalimar.

OTHERS:-The scope of works for construction of OHSR capacity 300 KL also includes –

a. Supply & installation of double flanged puddle collars, duck foot bands, sluice valves, tail pieces for installation of inlet, outlet, over flow and washout (scour) pipes.
b. Supply & installation of double flanged C.I. pipes for inlet, outlet, over flow and washout (scour) with specials and jointing materials as listed above.
c. Interconnection of outlet pipes and overflow from OHSR to distribution network and inlet pipe with rising main pipe line with all material.
d. Providing & installation of at least two sluice valves on each outlet, one sluice valve on each inlet, washout pipe of OHSR.
e. Provides valves chamber for all valves installed on inlet, outlet, washout and overflow pipes.
f. Providing washout pipes up to suitable length to drain the water from the structure in an environment friendly manner.
g. Final clearance of site before handing over the work including leveling of earth and disposal of surplus earth as per directions of the Engineer in Charge

3.2 Providing, laying, jointing, testing of Pipes

The work includes Providing laying, Jointing of Electrometric Sealing Ring Pipes as per concerned IS code including earth work, laying, jointing, testing and commissioning complete in all respect. This work also includes inter connection with existing system as per requirement. Size of pipes required for present work are:-

S.No.	Dia in mm	Length in m	
		Rising main	Distribution main
1	-	-	--

Preparatory work

The contractor will inspect the route along which pipe line is proposed to be laid. The contractor will conduct survey and prepare the L-section of pipe line. The pipe line section shall be approved and finalized from the Executive Engineer, PHED District Rural Dn.II Bikaner before starting of the laying & jointing work. Where ever there is need for deviation, it should be done with the use of necessary specials or by deflection in pipe joints. The alignment as proposed by the department should be marked by the contractor on ground with a line of white chalk and get approved by Engineer in charge.

The alignment, L-Section (depth of laying) and location of specials, valves and chambers may be changed at site if necessary in co-ordination with and after approval of the Engineer in charge.

Testing of Pipe line:- Sectional testing of each pipe line shall be done by the contractor as per detailed technical specification.

3.3 Final site clearance:-

Final site clearance and leveling of the working spaces for all structures, trench excavation for pipes and others ancillary works in all sorts of soil refilling and disposal of surplus earth suitable sits as directed by Engineer - in - Charge.

3.4 Operation and Maintenance along with defect liability period

The contractor shall operate and maintain the entire scheme for one year period after completion of scheme along with defect liability period for which no payment shall be made to the contractor. If required, repairs shall be made to maintain the scheme at the time of handing over to the department. The contractor shall maintain the scheme with technical and administrative monitoring. The contractor shall make communication and coordination with the PHED District Rural Division-II, Bikaner. The O&M work includes the staff, repair, transport, lubricants, and small consumable etc.

The Scope of work & Specials conditions of contract for operation & maintenance of scheme during defect liability period are as below:-

(A) SCOPE OF WORK:-

The work under the contract envisages the operation and maintenance of Water Supply Scheme on SPR basis for one year along with defect liability period. It includes deployment of sufficient skilled staff for efficient and successful operation and maintenance of plant and machinery, pump house, pipe lines and other fittings, replacement of spare if required, lubricating the machines, re-winding of motors, routine and periodical maintenance of plants etc. complete in all respect.

The details of various jobs to be carried out is as under:-

1. Pump houses are equipped with 2 Nos. clear water pumping sets, starters, MCCB, main switches and other installation (as per detailed list handed over to the contractor after of contract). Clear water pumping sets shall be operated to pump clear water into rising mains to fill OHSR. Pumping house shall be operated for design demand of 16 hours and as demanded by department. But the contractor shall have to keep his operating staff round the clock at head works so that pumping can be done in case of interrupted power supply.

   Log book and various other records maintained at para 8 of the special condition of contract shall be maintained by the contractor. The log book shall be securely kept in the pump house and made available to any officer of department for inspection. The completed log book shall be deposited to the Junior Engineer after making all entries. Pump house shall be cleaned daily including maintaining good look. Periodical and need based maintenance (Lubricating oil, grease, jute gland packing, electric bulb, starter oil, replacement of kit-kat fuse ad spare of starter replacement etc.) shall be done by the contractor. All these items shall be arranged by the contractor. No extra payment on this account shall be made by the department.
2. The water collected in CWR shall be simultaneously pumped into OHSR through rising main. Water level in OHSR shall be regularly checked and overflow shall be avoided.
3. Proper chlorination of filtered water shall be done @ 2.0 PPM with bleaching powder that means 8.0 mg per liter of bleaching powder shall be used for preparing solution for chlorination. Method of treatment shall be explained at the time of handing over of scheme.
4. Rising main shall be maintained by the firm and any leakage occurred shall be corrected on the same day of occurrence.
5. Motor re-winding & pump repairs shall be done by the contractor at his own cost, if required.
6. The OHSR shall be filled every day and there shall be no complaint from the users.
7. CWR & OHSR be cleaned once in six month and certificate from Officer Incharge shall be taken and handed over to department. All manhole covers shall always be locked and key made available in pump house.
8. The head works and space around various units shall be kept clean & in dry condition. Proper illumination will be ensured. No valve shall remain in leaking condition. OHSR shall be checked daily and ensure that they are filled with water & Proper supply from distribution system is maintained.
9. The contractor is required to submit the details of his staff which shall be engaged for operation and maintenance. At least one person from his staff be always available on scheme. The staff should be well dressed and should not be in drunk condition in duty time.
10. All security, safety of headwork, various units, machinery and equipment shall be responsibility of the contractor. Any loss due to theft or negligence shall be recovered from the contractor.

(B) SPECIAL CONDITION OF CONTRACT:-

1. The contract shall operate & maintain the scheme after its completion. After completion and commissioning the scheme will be handed over to the contractor. All units mentioned in handing over memo shall be handed over to contractor.
2. The contractor shall handover all the units in working condition on completion of contract.
3. The staff engaged for operation and maintenance of the scheme as per scope of work detailed separately shall be qualified and trained. Every time at least one employee of the contractor shall always be available on scheme.
4. The electric power shall be provided by JdVVNL at pumping stations. All expenses of power charges shall be borne by the department.
5. Adequate safety precaution for workers shall be observed by the contractor. Any sort of compensation due to loss of lives/retrenchment, accident etc. shall be borne by the contractor.
6. If additional accommodation is available at the scheme, it may be provided for residential facility for operating staff of the desired contractor on monthly basis as decided by the department.
7. The O&M work shall be for a period of **one year** from the date of commissioning of scheme. This period will run simultaneously with defect liability period. No extra payment shall be made for this work.
8. Following record shall be maintained and produced periodically by the contractor for proper monitoring by the Engineer-In-Charge.

   (a) Log book of raw water pumping, clear water pumping showing voltage, current interruption of power.
   (b) Log book of supply to OHSR at Village Palana
   (c) Record for operational staff on duty.
   (d) Record for daily consumption of chemicals and stock position.
   (e) Record for spares used & available in stock for maintenance of machines.

   All required log books shall be arranged by the contractor at his own cost. The Performa for log books shall be got approved from the department.

9. Payment terms:-

The due payment for the work shall be payable as below:

   (a) No separate payment shall be made for operational & maintenance work as it will be done during defect liability period of the contractor.
   (b) Deduction equal to 10% of the amount payable shall be done from all running A/C bills and final bill of the contractor against security deposit, which shall be refunded after completion of satisfactory work as per General conditions of contract. Other deduction of Income Tax, Sales Tax etc. shall be made as per Rules.

10. Incase of motor, stabilizer or any other components are damaged or burnt, it shall be sole responsibility of the contractor to rewind/repair the same as per standards and directions of the Engineer-In-Charge free of cost. The contractor may incorporate these charges in his offer. In case motor is not re-winded in time and scheme is closed, compensation @ Rs. 1000/- per day shall be levied for carelessness.
11. All parts of tools, plants required for operation & maintenance of valves, pumping sets, pipe lines shall be arranged by the contractor at his own cost however the tools available with the department shall be supplied free of cost and same will be deposited back to the department on completion on contract period.
12. The complete work as defined in the scope of work includes operation, maintenance of complete scheme starting from outlet to the taping points at Distribution system what so ever along with periodical preventive maintenance of each and every unit and equipment. **Any associated work which has been left to be maintained in the scope of work but is necessary to be done for smooth running of scheme will also have to be done by the contractor.** He should include cost of such work in his offer. The offered rate shall be deemed as inclusive of all items. In the event of strike or absence of staff employed by the contractor the department shall be free to operate & maintain the scheme at the risk and cost of contractor. In case of unsatisfactory performance by contractor in operation and maintenance liquidated damages @ 0.25% of contract value per week of unsatisfactory performance, subject of maximum of 10% of contract value shall be levied as compensation. Decision of Engineer-In-Charge shall be final & binding upon the contractor regarding such compensation.

13. In case of less supply of water by the contractor for a period of four weeks or more, a compensation equivalent to 50% of the proportionate less supply for reason well under control of the contractor shall be levied, No compensation shall be levied for less supply if the reasons are beyond the control of the contractor. The matter regarding less supply and compensation shall be decided by the Executive Engineer, PHED City PDR Division-III, Bikaner. In case he fails to restore the water supply within 48hours, the compensation shall be levied as given below:

S.no.	Period of delay beyond the specified period	Compensation (Rs. Per Day)
1.	0 to 24 hours	500.00
2.	24 to 48 hours	1000.00
3.	48 to 72 hours	1500.00
4.	and So on	500.00 Per day.

4. The contractor shall repair the leakage in the pipe line on the same day of their occurrence if he is having necessary spare available on the scheme. If he fails to repairs leakage within 24 hours of occurrence, compensation @ Rs. 500/- per day per leakage shall be levied on the contractor. No compensation shall be levied if there is no fault of the contractor, such as non availability of the material in the department store. Proper chlorination as per norms shall be ensured and pollution in distribution system due to leakage etc. shall not be allowed. Contractor shall be solely responsible for any loss of lives or any casualty if chlorination is not done properly and water borne diseases are spread up. Any compensation to such users shall be given by contractor if needed so.

15. Any repairs to the structure damaged due to natural calamities or ageing shall be done by the department but any repair required due to damage caused by carelessness of the contractor shall be done by the contractor at his own cost. If contractor fails to operate and maintain the scheme for one year his earnest money/Bank guarantee amounting to Rs. 0.50 Lacs will be forfeited and action for cancellation of registration shall be taken.

16. The Contractor should carefully check that:-
    (a) He has quoted rates for all items for execution and commissioning of each and every unit.
    (b) He has considered cost for operation and maintenance of scheme for one year in rates of items to be executed.
    (c) He is having no objecting if his incomplete offer is not considered for approval and department is free to take action for cancellation of registration for submitting incomplete offer thereby misleading the department.

17. The tenderer may quote any condition without materially effecting the scope of work and performance of the job which may help in bringing clarity in terms & conditions of the contract. However the department reserves the right to accept or reject such conditions. In any case such condition must not be in contradiction to the conditions of the department.

Signature of Tenderer

Executive Engineer
PHED District Rural Division II
Bikaner

TENDER DOCUMENT FOR

CONSTRUCTION & COMMISSIONING OF RCC OHSR 300 KL CAPACITY VILLAGE PALANA

TEHSIL BIKANER
DISTRICT BIKANER

ESTT. COST: RS. 42.00 LACS
NIT NO. 317/2019-20

VOLUME-III

DRAWINGS

EXECUTIVE ENGINEER
PHED DISTRICT RURAL DN.II BIKANER

TENDER DOCUMENT FOR

CONSTRUCTION & COMMISSIONING OF RCC OHSR CAPACITY 300 KL VILLAGE PALANA

TEHSIL BIKANER
DISTRICT BIKANER

ESTT. COST: RS. 42.00 LACS
NIT NO. 317/2019-20

VOLUME-IV

PRICE BID (BILL OF QUANTITIES)

EXECUTIVE ENGINEER
PHED DISTRICT RURAL DN.II BIKANER

1. PREAMBLE TO PRICE SCHEDULES

1.0 Price Schedule for Work

1.1 The Contract is of percentage cum item rate contract on single responsibility basis for design, construction, commissioning, testing, trial run and operation and maintenance and repairs for complete executed works for one year along with defect liability period.

1.2 Bidder has to quote percentage for the G-Schedule and item rates for H-schedule of the bill of quantities for the entire work as per the detailed scope of work and specifications in the Tender Form. The items envisaged in the contract are given in the scope of work and are also stipulated in the bill of quantities.

1.3 The Bidder should quote his rates in online excel format of the price bid. The Bidder shall quote his rates in item rate schedule and percentage above/below in BSR schedule in figures in specified cells of Price bid or Bill of Quantities. The online program of eprocurement shall automatically put rate in words (English) and worked out amount on the basis of quantity of work and rate offered by the Bidder in the specified cells of excel file.

1.4 There are, however, several minor items not specifically mentioned in the break-up of H-schedule items but shall be required to complete the job on turnkey basis as per scope and specification of works stipulated in the tender document. The costs of such works shall be deemed to have been included in the lump sum cost quoted and no separate additional payment shall be admissible for such items.

1.5 For calculation of pipe length for payment purposes, the laying length of sluice valve & dismantling joints and any other length of pipe in scope of work of items other than pipeline shall be deducted from overall length, as the same are being paid separately.

1.6 As per central Government notification no 06/2006 dated 1-3-2006, as amended by notification no. 06/2007 dated 1-3-2007, 26/2009 dated 4.12.09 and latest circular no.945/6/22011-CX Dt.16.5.2011 with latest modifications, excise duty exemption is available for the material used in specified components of water supply projects. The Bidder may study the notification carefully and account for the exemptions that are to be availed while preparing their price bid, Necessary certificate from the District collector shall be arranged by the department as & when required. Department assumes that bidder has considered exemption of excise duties applicable for analyzing his financial offer for approval.

"If the Central Government through it notification issued after submission of tender for exempting other components of material from excise duty and the contractor avails the benefit of exemption the same shall be passes to the department."

1.7 The Bidder is advised to examine all instructions, forms, terms, specifications and other information in the Tender documents and consider and evaluate fully the price implications therein contained before filling the rates.

1.8 The Bidder should acquaint himself with the site conditions including the access to Work site. The successful Bidder shall have to make suitable access to work sites at his own cost.

1.9 The Bidder shall be deemed to have allowed in his price, provision for survey, designs, field investigations, site clearance, contingencies, maintenance and final removal of all temporary works of whatsoever nature required for construction including temporary bunds, diverting water, pumping, dewatering and availability of material of required quality etc for the proper execution of works. The rates shall also be deemed to include any works and setting out that may be required to be carried out for laying out of all the works involved.

1.10 Lowest financial responsive offer shall be the sole criteria for accepting and evaluating tender.

1.11 It will be entirely at the discretion of the department to accept or reject the Bidder proposals without giving any reasons whatsoever. The Bidder must carefully go through the provisions laid down in the ITT regarding the deviations allowed, and the likely reasons, which may lead to the rejection of Tenders and / or forfeiture of the earnest money.

1.12 The prices and amounts quoted by the Bidder shall allow for all costs including labour, materials, construction plant and equipment, transport charges, any other expenses to fulfil the obligations towards any ITT clause of the tender document refered at clause 3.1, Custom Duty, Octroi, Excise Duty, Incoume Tax, Sales Tax, labour Tax, Turnover Tax, Service Tax,

Professional Tax or any other duties, levies, taxes & labour cess etc. Work contract tax or charges whatsoever to the State or Central Department or to the Local Bodies on the components or the completed Works or the operation and maintenance works and for satisfactory performance of the Bidder's obligations under this contract

1.13 In the event of the Tender being accepted, the contractor has to agree to enter into a formal Contract Agreement with the department incorporating the conditions of Contract there to annexed but until such agreement is prepared; this Tender shall constitute a binding Contract between both parties.

1.14 The department is not bound to accept the lowest or any Tender received.

Dated this _____day of _____ 20___

Company Seal

(Signature)

(Name of the Person)

(In the capacity of)

(Name of firm)

Duly authorized to sign Tender for and on behalf of
(Fill in block capitals)

ESTIMATE

Name of Work : Construction of RCC Over head service reservoir (OHSR) of 300 KL capacity village Palana G.P. Palana

(Rates are baed on PHED BSR 2019)

SN	BSR Ref.	Particular	Unit	Qty.	Rate	Amount
1	PHED BSR 2019	Construction of RCC *INTZE* type Over Head Service Reservoir of following capacity and staging consisting of excavation in all types of strata, RCC work, cement plaster with water proofing compound to the inner face of the container including refilling disposing off the surplus stuff, plinth protection , all labour and material charges including providing and fixing of accessories such as ladder , manhole frame and covers, water level indicator (float type), ventilator with SS scren, lightening arrestor, float valve, puddle collar, G.I. pipe railing around walk way and top dome, providing RCC staircase from 4.5 mtr height of ground level to top level, chambers for all valves, providing and applying three coats of cement paint to the external surfaces of container, food grade epoxy paint to internal surface and giving satisfactory hydraulic test and water tightness test as per I.S. code, etc. complete in all respect as per design data, criteria, obligatory requirements and detailed specifications, scope of work and GA drawing. The job includes painting the name of the scheme and other details on the reservoir, providing alluminium portable ladder suitable to reach at height of 4.5 Mtr and any other work related to structure as per the directions of Engineer-in- Charge, Technical Specification and Scope of Work . For foundation on SBC more than 5 MT/sqm and upto 8 MT/sqm, add 7.5%. Rates for RCC OHSR, SBC 10T/sqm, seismic zone II and Staging 18 Meter.- 300 KL	Ltr.	300000	12.15	3645000.00
2	PHED BSR 2019	Providing and flxing double flanged ISI marked DI Class K-9 pipes as per IS:8329-2000 (amended upto date), as vertical pipes for RCC Reservoirs including specials required such as duckfoot bend, bend, tee etc. providing clamps at every 3 mtr, jointing materials such as nuts, bolt, rubber packing, hydraulic testing etc. complete in all resepect upto and from valve chamber as per direction of EIC, Technical Specification and Scope of work. -100mm dia	Mtr.	24.3	1634	39706.20
3	PHED BSR 2019	Providing and flxing double flanged ISI marked DI Class K-9 pipes as per IS:8329-2000 (amended upto date), as vertical pipes for RCC Reservoirs including specials required such as duckfoot bend, bend, tee etc. providing clamps at every 3 mtr, jointing materials such as nuts, bolt, rubber packing, hydraulic testing etc. complete in all resepect upto and from valve chamber as per direction of EIC, Technical Specification and Scope of work. -200mm dia	Mtr.	160	3219	515040.00
					Total :	4199746.20
					Say (Rs. In Lacs.):	**42.00**